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A CONTRIBUTION TO THE STUDY OF ARTERIO-SCLEROSIS.

Being a Thesis for the Degree of M.D. of the University of Birmingham.

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PART.1.

The Pathological condition Arterio-sclerosis has been variously described by different Authors.

Savill.in opening a discussion on Arterio-sclerosis before the Pathological Society of London.(Feb:16.1904.),said that he was accustomed to define Arterio-sclerosis as a chronic generalised thickening,condensation,or degeneration of the Arterial walls,in which after death,the lumen does not collapse as usual,and the walls are harder and less elastic than normal. Histologically,such a condition may occur in three situations,-in the Tunica Media,when it is medial sclerosis,-in the Tunica intima,i.e.Intimal sclerosis,and in the Tunica adventitia,i.e.adventitial sclerosis.

Dr.Noël Gueneau de Mussy in "Étude Clinique sur les Indurations des Artères",which appeared in the "Archives Générales de Médecine"of 1872.P.129.showed that "induration" was common in ~~early~~ early and middle life and not necessarily present in old age; and he included atheroma in the term "induration".

Ziegler says that "sclerosis in an artery implies the existence of local thickening of its inner coat" and he then proceeds to describe Atheroma. He was the first to describe in detail and to discuss "Arterio-sclerotic atrophy of the Kidney". He showed that the renal arteries and their branches in old people are very often the seat of sclerotic changes which may simultaneously affect the arteries of other regions also, or be confined to the Kidney. In this condition the intima of the arteries is much thickened, and the lumen correspondingly narrowed or obliterated; and he showed that this change gave rise to a special form of contraction of the organ, which he named "Arterio-sclerotic Atrophy". (*Lehrbuch der Allg. Spec. Patholog. Anatomie.*)

All German Pathologists use the term Arterio-sclerosis to describe atheroma, whatever else is included under the term. Of all the German work, that of Thoma has more especially influenced opinion in England and America, in the meaning of the term Arterio-sclerosis. His views are that the elasticity of the vessel wall becomes reduced in general diseases, in acute and chronic infective diseases, in long standing disturbances of general nutrition, by many poisonous substances, and by functional overstraining from an increase of the Heart's action. As a result the vessel dilates and the blood stream becomes slower in the dilated vessel, This slowing is the cause of the new formation of connective tissue in the intima of the widened artery. The new formation of Connective tissue renders the

vessel wall more firm, so that it appears more rigid and less yielding. (Arterio-sclerosis)"Pathology and Pathological Anatomy. English translation, p. 247." Thus Thoma holds that the thickening is secondary to dilatation and is consequent on the slowing of the stream in the dilated vessel; that the thickening is to compensate for the assumed widening, and to restore the equilibrium between the lumen and the contained blood, which had been lost. He asserts that by this means the rapidity of the blood stream is re-established.

Lancereaux (L'Endartérite ou Artério-sclérose Généralisée" in "Archives Générales de Médecine. 1893. pp. 5. & 164.") describes the condition as a proliferation of the cells of the Intima, which goes on to fatty degeneration, due to failure of nutrition.

Huchard (Maladies du coeur et des vaisseaux. 21ème édition. Paris. 1893). mentions that the German authors always describe Arterio-sclerosis as Atheroma of the arteries, and he asks if the terms are synonymous. He answers in the negative absolutely. He uses the term to designate a general condition of which Atheroma is only one of the numerous manifestations, and in which chronic inflammation of the intima of the small vessels - an endarteritis obliterans - is also included. He thus describes an arteritis of the small vessels as Arterio-sclerosis.

In the last edition of Clifford Allbutt's System of Medicine. (1899). Vol. VI. is an article by Dr. F. W. Mott. "Arterio-

Sclerosis."This author adheres to the views of Thoma, and gives under the heading of Introduction, the following:—"The name Arterio-sclerosis is applied rather loosely to a thickening of the vessel wall. It includes the obvious naked eye changes in the large arteries, named by some authors Atheroma, by others Arteritis Deformans. It includes also Arterio-capillary fibrosis, a change first described by Gull, & Sutton in the walls of the smaller vessels, which only becomes obvious on microscopic examination. Mott then gives his definition of Arterio-sclerosis as "A local or general thickening of the arterial wall, with loss of elasticity, occasioned mainly by fibrous overgrowth of the Tunica Intima, secondary and proportionate to weakening of the muscular and elastic elements of the Media." Mott goes on to say that "When Arterio-sclerosis affects the Aorta and larger vessels, it is usually named Atheroma; some authors preferring the name Endarteritis deformans, of this there are two forms: -nodosa or circumscripta, and diffusa." Thus it is seen, that Mott includes Atheroma in his description of Arterio-sclerosis.

Gull and Sutton, (1872-1877), in writing of the relation of Granular Kidney to changes in the vessels and Heart which accompany granular kidney, gave as their view that there occurred a generalised change or disease in the vessels to which they gave the name "Arterio-capillary fibrosis". The changes in

the kidney being regarded as secondary to the vessel thickening. George Johnson, (1850-1873), was the first to show that thickening of the muscle coat of the arteries occurred in granular Kidney, and he held that the changes in the Heart and vessels were secondary to the primary kidney changes.

Dickinson, (1875) held that a growth of fibrous tissue in the kidney was the primary change, while the changes in the vessels were secondary. In the prodromal stage of the disease, a spasm of the vessel is probably brought about by the circulation of irritating toxic products; This causes a contraction of the functionally active portion of the vessel (artery), namely the muscular coat, this causes an increased peripheral resistance, and consequent increased force of the cardiac beat, and increased arterial blood pressure. This increased function of the Arteries and of the Heart leads to an hypertrophy of the Muscular elements. Clifford Allbutt, however ascribes the hypertrophy as due, not to excessive contraction of the arteries, but as in the Heart to a compensation to the dilating pressure, for in other diseases, e.g., Raynaud's disease, where there is a spasm, there is no thickening.

Dr. William Russell in a paper in the Lancet, (June.1.1901) gives the result of his observations on Arterio-sclerosis under seven headings, as follows:-(1). Atheroma and Arterio-sclerosis are two totally distinct Clinical and Pathological entities. (2). Atheroma is a localised and patchy affection of the arter-

-ies characterised by degenerative changes, which have long been recognised. (3). Arterio-sclerosis is a generalised affection of the arteries characterised by (a) thickening of the Tunica Media, this thickening being primarily a true hypertrophy, although it may ultimately show some degeneration. (b) thickening of the Tunica Intima, from hyperplasia of the sub-endothelial connective tissue, without atheromatous degeneration, (c) in some instances fibrous thickening of the Tunica Adventitia. (4). The changes in the arteries of the Kidney differ from those in the Radial artery, and even in the Renal arteries themselves before they enter the kidney. They differ in the following respects. In the Kidney the thickening of the Intima is proportionally greater, the Media is not appreciably thickened, it may be even atrophied and may have undergone Hyaline degeneration (the atrophic changes in the kidney are in proportion to the sclerotic changes in the vessels). (5). The lumen of the Radial Arteries and of the ~~other~~ arteries in the kidney is markedly diminished. (6). The changes in the nutrient arteries of the Brain, and ^{probably} of the cord also, correspond with those in the arteries of the kidney. (7). Arterio-sclerosis may be associated with more or less atheroma in the same subject

Dr. William Russell in his paper, and also in "Arterial Hypertonus, Sclerosis and Blood-Pressure. 1907" describes the cause of "Arterio-sclerosis"; He says, that spasm of a muscle is no-

-thing more than an exaggerated "tone" or "tonicity",and he applies this to the Media of the Arteries,and describes the spasm as "Hypertonus",or "Hypertonicity". He says the spasm is produced by toxic substances circulating in the blood. In concluding his paper in the Lancet,Dr.Russell gives the relationship between Arterio-sclerosis and Hypertonus. He says that recurring or continuous hypertonus leads to hypertrophy of the Media (muscle)of the arteries,under the Physiological law that increased function in muscle leads to hypertrophy. The thickened Intima,which he describes as occurring in Arterio-sclerosis,he considers to be due to the circulation of irritating substances in the blood,which act on,and irritate the sub-endothelial connective tissue,leading to fibrous hyperplasia. Dr.Russell gives the result of Sixteen cases in his paper.In only Two of these did the Media show a pure Hypermyotrophy as described by Savill in his Paper read before the Pathological Society of London. In the cases described by Savill in this paper,the Intima is not described as thickened, most of his cases being pure cases of Hypermyotrophy primarily, some of which however show secondary degeneration,such as Cloudy swelling,Fatty degeneration,Necrosis or Calcification. Fibrosis,Savill says,he has never seen.

From the above History it will be seen that the German,and French schools describe Atheroma under the head of Arterio-sclerosis,while among the English authors Mott describes Ath-

-eroma under the head of Arterio-sclerosis, whilst Russell and Savill both say that Arterio-sclerosis and Atheroma are two distinct conditions, with essential differences. Russell says that Arterio-sclerosis consists in Hypertonicity of the Media, with Hyperplasia of the Intima, while Savill says it consists of an Hypertrophy of the Media, but describes no Intimal thickening.

Having these various interpretations of the Pathological condition Arterio-sclerosis in my mind, my object in working on the subject of this Thesis has been, to try and show what the condition really is, and what relation, if any, it bears to Atheroma. My observations have been made somewhat on the lines of a paper referred to above, which was read by Dr. Savill before the Pathological Society of London, in introducing a discussion on Arterio-sclerosis, and reported in the Transactions of that Society, Vol. LV. 1904.

With this purpose I examined sections of the Radial Artery and the Kidney in a number of cases occurring in the Post-Mortem Room of the General Hospital, during my term of office as Resident Pathologist, I also examined sections from Post-Mortem occurring at the Queen's and General Hospitals during my time as House Physician at these Hospitals.

Knowing that Arterio-sclerosis was usually associated with Chronic inflammation of the Kidney, the cases which I have taken

for my observations, numbering Fifty-seven, have mostly been cases which showed some chronic inflammation of the kidney at the Post-Mortem Examination

As far as I could ascertain little attempt has been made to systematically measure the diameter of the Lumen and the thickness of the three tunics of the Radial Artery in cases showing chronic inflammation of the Kidney, with this object therefore I commenced collecting my cases.

In describing my cases I have followed a definite order, describing the case under Seven headings as follows:-

1. Description of the Shape of the Radial Artery, followed by measurements of the Diameter of the Lumen and of the average thickness of the Media, Adventitia and Intima, with any morbid change that they showed.

2. The description of the Macroscopic and Microscopic appearances of the Kidney, with reference to the relative size of the Media and Intima, in the branches of the Renal Artery in the Kidney.

3. The Cause of Death.

4. Associated Morbid conditions.

5. Possible causes of the conditions found in the Radial Artery, as ascertained from the notes or subsequently.

6. The Maximum Systolic Blood-Pressure, when it was recorded in the Clinical Notes, as observed with either Lockhart Mummery's,

the section was placed in Weigert's Resorcin Fuchsin for 20 minutes. The excess of the stain was then washed off in water, and was replaced by Van Geisen's stain for 30 seconds, the section was then dehydrated and cleared and mounted in Canada Balsam. The measurements of the lumen, and of the three tunics were then taken with an eye-piece micrometer, which was subsequently graduated to hundredths of a millimeter.

In measuring the lumen, the average of the major and minor diameters were taken. In measuring the tunics of the artery, six measurements were taken at different parts of the artery and the average taken.

Before drawing any conclusions from my series of sections, it was necessary to find an artery and Kidney, which would represent the normal Histological conditions.

I therefore looked for a case of a person dying from the result of an accident, whilst apparently in the best of health. I have included two such cases in my series, namely Case.7. and Case.15. The cases were both Male, and their respective ages were 37. & .41. Case.7. was that of a man, who died as the result of a Railway accident, and who from his occupation as a Porter would be subject to undergoing severe muscular strain. In addition he had signs of chronic inflammation in the Kidneys. Case.15. was that of a man, who was a Bank Cashier, and therefore had probably undergone little really hard muscular work, although

from his clinical notes he is said to have taken "some" alcohol, and was said to have had some just before being brought to the Hospital. The cause of Death in this case was Extra-dural haemorrhage, as a result of being run over by a Cab. I therefore took Case.15. as my standard or type case, believing that it approached as near the normal condition as it was possible to obtain one.

The Measurements given by Savill, in his paper, of the Lumen, Tunica Media, Tunica Adventitia, and Tunica Intima, do not correspond with my measurements, in fact no Radial artery in my series has such a large lumen, as Savill describes as the normal.

The measurements as given by Savill compared with mine in

Case.15.are:-	Savill,	Case.15.(My Type).
Lumen.	2.2.mm	1.54.mm.
Tunica Media.	.27.mm.	.285.mm.
Tunica Adventitia.	.22.mm.	.0973.mm.
Tunica Intima.	.11.mm:	.0175.mm.

I will now proceed to describe my series of 57 Cases.

PART.2.

Case.1. Martin.C. aged.58.

1.The Radial Artery is elliptical in shape.The Lumen is dilated,the average diameter being,1.737.mm. The Media is irregularly thickened,the average thickness being,0.34125.mm.The Elastic Fibres are well seen. The Adventitia is not thickened, it measures,0.0875.mm. in thickness. The Intima is rather irregularly thickened,the average thickness being,0.067.mm.The thickening is seen to be due to an increase in the number of the Elastic Tissue fibres. Henle's Internal Elastic Lamina is well seen.

2.The Kidneys show Cyst formation on the surface. Macroscopically,the Cortex is narrowed.The Capsule strips well,but leaves a slightly granular surface. Microscopically,there is seen to be a diffuse interstitial fibrosis,with thickening of Bowman's Capsule in a large number of the Glomeruli,and fibrosis of the remaining ones. There is marked small cell infiltration of the fibrous tissue.There is acute Catarrh of the Epithelium lining the Tubules,with desquamation of many of the cells.

The Intima of the branches of the Renal Artery in the Kidney is thickened,with increase of the Elastic tissue fibres. The Media appears atrophied. The Kidney condition is one of acute inflammation,occurring in an organ the seat of chronic inflammation.

3. Cause of Death. Uraemia. (6 hours after admission in the state of Coma).

4. Associated Conditions. (a) Hypertrophy of the Heart. (b) Chronic Pericarditis, with effusion. (c) Atheroma of the Aorta, of the Coronary, and of the Cerebral arteries.

5. Possible cause of the thickened Intima and Media of the Radial artery. None given in the Clinical notes.

6. Blood-Pressure. Shortly after admission was 260. mm.

7. The Lumen of the Radial Artery is dilated. The Media shows Hypertrophy. (Hypermyotrophy). The Intima shows marked thickening. The Adventitia is slightly thinned.:-

	1.737.	0.34125.	.0875.	.0671.
Lumen.	-----	Media.	-----	Adventitia.
	1.54.	0.285.	.0973.	.0175.

N.B. As mentioned in the introduction to this Thesis, the fractions given under section 7. above, are obtained by placing the measurement of the Artery under review as the numerator, the corresponding measurement in the Standard Artery being placed as the denominator. This also applies to the fractions given in the report of my subsequent cases.

Case.2. Thomas.M. aged.12.

1.Radial Artery.The Artery is slightly elliptical in shape.The average diameter of the lumen is 0.756.mm.which is less than half the standard measurement. The Media is of fairly uniform thickness,but shows cloudy-swelling,its average measurement is 0.147.mm. The average measurement of the Adventitia is 0.0525. mm. The Intima is thickened,and measures 0.04375.mm.The Elastic fibres are increased in number.

2.The Kidney macroscopically shows a number of Septic Infarcts. Microscopically,a number of Miliary abscesses are seen,while the Glomeruli contain plugs of Staphylococci,surrounded by small cell exudation.The Capsule is not thickened. The whole Kidney is congested. The Epithelium lining the tubules,is largely desquamated. There is no change observed in the branches of the Renal artery in the Kidney.

3.Cause of Death.Pyæmia following Periostitis of the Tibia.

4.Associated conditions.Fibrinous Pericarditis. Endocarditis. General Miliary abscesses.

5.Cause of the Intimal Thickening.Toxins circulating in the Blood.

6.Blood-Pressure. No observation.

7.The Lumen is contracted to half its Normal size -----0.756.
1.54.
Media measures a little more than half the standard,namely 0.147. -----
0.285. The Adventitia is also only a little more than half

the Standard measurement, 0.0525. The Intima is thicker than
0.0973.

the Standard, 0.04375. The measurements in this case are, with
0.0175.

the exception of the Intima, very small. This is accounted for
by the fact that the Patient was only 12 years old.

Case.3. John.B. aged.52.

1.The Radial Artery is elliptical in shape, and the Lumen is somewhat dilated, the average diameter of the Lumen being, 1.6975. mm. The measurement of the Media is about the same as the Standard, being, 0.2835. mm. The Elastic tissue fibres, and Henle's Internal Elastic Lamina are both well marked. The Adventitia is slightly less than the Standard measurement, being, 0.0875. mm. The Intima is thickened, the average thickness is, 0.04125. mm.

2.The Kidneys show diffuse interstitial fibrosis, with thickening and downgrowth of the Capsule. Many of the Glomeruli are converted into fibrous knots, whilst there is thickening of Bowman's Capsule in the remaining Glomeruli. The Tubular Epithelium shows acute Catarrh. The branches of the Renal Artery in the Kidney show Intimal thickening, with increase of the Elastic tissue fibres, and Atrophy of the Tunica Media.

3.Cause of Death. Chronic Alcoholism. Chronic Nephritis. Pneumonia. Heart Failure.

4.Associated Conditions. Pericarditis. Hypertrophy of the Left Ventricle. Extensive Atheroma of the Aorta, and of the Coronary and Cerebral Arteries. The change is not marked in the former.

5.Cause of the Arterial changes. Alcohol. Patient had had three attacks of Delirium Tremens in the last year of life. He had been in the Navy 20. years before.

6.Blood-Pressure. Not recorded.

7. The Lumen is slightly dilated, $\frac{1.6975}{1.54}$. The Media is about

normal in thickness, $\frac{0.2835}{0.285}$. The Adventitia is slightly less

than the ~~normal~~ standard. $\frac{0.0875}{0.0973}$. The Intima is much thickened

$\frac{0.04125}{0.0175}$.

The change in this vessel is chiefly intimal.

Case.4. William.G. aged.46.

1.The Radial artery is a little flattened and contracted.The average diameter being,1.30375.mm. The Media is much thinner than the standard,the measurement being,0.1603.mm.The muscle itself is healthy.The Adventitia is also thinned,being 0.0437.mm.The Intima is not markedly thickened,it measures,.032.mm.

2.The Kidney naked eye shows cloudy-swelling,with slight difficulty in stripping the capsule. Under the Microscope,the capsule is seen to be thickened,with downgrowth of fibrous tissue into the kidney substance.The Glomeruli are largely fibrosed. The Epithelium shows cloudy-swelling.There is no change observed in the arteries in the kidney.

3.Cause of Death.____.Gangrene of the Lung from ulceration into it of a malignant growth of the Oesophagus.

4.Associated conditions.Hypertrophy of the Left Ventricle.Pericardial effusion.Atheroma of the Aorta,and of the Coronary arteries,(none of the Cerebral arteries).

5.The only possible cause which can be given of the slight degree of Intimal thickening,is the circulation of Toxins from the gangrenous lung,or the oesophageal growth,or both.

6.Blood-pressure.The Patient died before admission.

7.Lumen.1.303.Media.0.1603. Adventitia.0.0437. Intima.0.032.
1.54. 0.285. 0.0973. 0.0175.

The Artery shows slight Intimal thickening.Media is thinned.

Case. 5. Mary. P. aged. 54.

1. The Radial Artery is elliptical. (during life it was described as being thick). The average diameter of the lumen is 1.225. mm. The Media is slightly thinned, and fibrosed in its deeper layer, there are two or three areas of calcareous degeneration, involving the whole thickness of the muscle. The Media measures, 0.245. mm. There is some calcareous Atheroma of the Intima, but it is distinct from the calcareous change in the media, although Henle's Internal Elastic Lamina is absent in this part of the artery. The Intima measures, 0.07. mm. and in the healthier parts shows an increase in the number of elastic tissue elements. The Adventitia measures 0.0525, mm. and is slightly thinned.
2. The Kidney is large and congested. Under the Microscope, there is seen to be a diffuse interstitial fibrosis, with sclerosis of some of the Glomeruli, while others show only thickening of Bowman's capsule. The Vessels are congested. There is no change to be seen in the arteries in the Kidney.
3. Cause of Death. Malignant Growth of the Tail of the Pancreas.
4. Associated conditions. Pericardial Effusion. Hypertrophied Left Ventricle. Atheroma of the Aorta, with calcareous atheroma of the coronary arteries at their origin from the Aorta. Fatty atheroma of the rest of the Coronary arteries.
5. Possible cause of the Intimal thickening, is the circulation of Toxins in the blood, probably derived from the Growth.
6. Blood-pressure. Said to be medium, in the clinical notes.

7. Lumen.	<u>1.225.</u>	Media.	<u>0.245.</u>	Adventitia.	<u>0.0525.</u>	Intima.	<u>07.</u>
	1.54.		0.285.		0.0973.		.0175

There is thickening of the Intima, with some Atheroma, this has caused a narrowing of the lumen. The Media and the adventitia are both somewhat thinner than the standard.

Case.6. David.W. aged.70. Occupation.Currier.

1.The Radial artery is rounded and contracted. The average diameter of the lumen is 1.0675.mm. The Media shows irregular ~~thickening~~^{thinning}, with calcareous degeneration in parts. The average thickness is 0.23825.mm. The Adventitia is thicker and denser than normal, with increase of fibrous tissue. The average thickness is 0.07.mm. The Intima is irregularly thickened, the average being 0.04375.mm.

2.The Kidneys are pale and fatty. Microscopically, there is seen to be a diffuse interstitial fibrosis, with thickening of the capsule, and fibrosis of many of the Glomeruli. In the remaining Glomeruli Bowman's Capsule is thickened. The Epithelium lining the tubules shows cloudy-swelling. Both the intima and the media of the arteries in the kidney appear thickened, but equally so.

3.Cause of Death. Perinephritic Abscess. Enlarged Prostate.

4.Associated conditions. Hypertrophy of the Left Ventricle.

Atheroma of the Aorta and of the Coronary arteries.

5. There was nothing in the clinical notes to throw any light on the possible cause of the thickened intima, and contracted lumen, but the circulation of the toxins absorbed from the abscess, probably caused a spasm of the artery

6.Blood-Bressure. Not observed.

7. Lumen.	1.0675.	Media.	0.23825.	Adventitia.	0.07.	Intima.	0.0437
	1.54.		0.285.		0.0973.		.0175

Intima thickened.

Case.7. Ernest.H. aged.37. Occupation.Porter.

1.The Radial Artery is slightly oval in shape.The Lumen is small and contracted,the average diameter of the lumen is.848. mm. The Media is thickened and shows well marked fibrosis,while the elastic tissue fibres are well seen. The average thickness of the Media is 0.32375.mm.The Adventitia is slightly thinner than normal,the average thickness being 0.0525.mm. The Intima shows irregular thickening,while at one spot there is a patch of Atheroma.At this spot Henle's Internal Elastic Lamina is absent.The average thickness of the Intima is 0.063.mm.

2.The Right Kidney was torn across,while the Left one appeared fairly normal.Microscopically,there is seen to be slight thickening of the capsule,with a few downgrowths of fibrous tissue into the kidney substance,these downgrowths are infiltrated with small round cells. Bowman's Capsule is thickened in most of the Glomeruli.The Epithelium is healthy. The branches of the Renal artery in the Kidney show some thickening of the intima with increase of the elastic tissue elements.The media is slightly atrophied,but not very markedly so.

3.Cause of Death.Rupture of some of the Internal viscera as the result of a Railway accident.

4.Associated conditions.Hypertrophy of the Left ventricle,and Atheroma of the Aorta.

5.A possible cause of the thickened Media was the fact that the Patient worked as a Railway Porter.

6. Blood-pressure. The Patient was dead on admission to the Hospital.

7. Lumen.	<u>0.848.</u>	Media.	<u>0.3237.</u>	Adventitia.	<u>0.0525.</u>	Intima.	<u>0.063</u>
	1.54.		0.285.		0.0973.		.0175.

The Lumen is contracted and the Media thickened, thus the Artery shows a condition of Hypertonus as described by William Russell. The Intima is also thickened, which was described as accompanying Hypertonus in many of Russell's cases.

Case.8. Matilda.E. aged.52.

- 1.The Radial Artery is somewhat flattened and contracted, the average diameter of the lumen being 1.00187.mm. The Media is of regular thickness, but is much thinner than the standard. The average thickness is 0.14.mm. The Adventitia is slightly thickened, the average measurement being 0.105.mm. The Intima shows thickening with increase of the elastic tissue fibres. The average thickness is 0.0525.mm.
- 2.The Kidneys show cloudy-swelling. Microscopically, the Glomeruli are congested. The Epithelium lining the tubules shows Cloudy-swelling. The Intima of the branches of the renal artery in the kidney show a thickening with increase of the elastic tissue fibres. The Media is atrophied and thin.
- 3.Cause of Death. Localised Peritonitis, with Pneumonia and Pleurisy, following an operation for Pyloric Stenosis. The organism found in the pus in the Abdomen, proved to be the Pneumococcus.
- 4.Associated conditions. There was no Cardiac Hypertrophy or Atheroma observed.
5. Possible cause of the contracted arterial lumen. The circulation of toxins from the pus in the Abdomen, causing a spasm of the media and consequent narrowing of the lumen. The thickening of the Adventitia and of the Intima, is possibly a compensatory condition to balance the thinning of the Media.
- 6.Blood-pressure. Not observed.

7. Lumen. 1.001875. Media. 0.14. Adventitia. 0.105. Intima.
1.54. 0.285. 0.0973.

0.0525. The Lumen is spasmodically contracted, as mentioned in
0.0175.

5. above. The adventitia and Intimal thickening is compensatory
to the thinning of the Media.

Case.9. George.T. aged.49.

1.The Radial Artery is fairly round and the lumen is contracted, the average diameter being, 1.33.mm. The Media is thickened and measures, 0.313.mm. The Elastic fibres are well seen. The Adventitia is of about the Standard thickness, being, .0875.mm. The Intima is of fairly uniform thickness, being, 0.0313mm.

2.The Kidneys show a very marked change, being converted into a number of Cysts, while the remaining kidney tissue shows marked fatty change, with fibrosis. Microscopically, there is a diffuse interstitial fibrosis, with thickening and downgrowth of the Capsule and small cell infiltration. Bowman's Capsule is thickened in many of the Glomeruli, while the remaining ones are converted into fibrous knots. There is much Cyst formation of the tubules and the Epithelium is in a state of Cloudy-swelling. There is cloudy-swelling and thickening of the Media of the branches of the Renal Artery in the Kidney, the Intima is normal.

3.Cause of Death. Periurethral Abscess.

4.Associated Conditions. Hypertrophy of the Left Ventricle of the Heart. Atheroma of the Aorta and Coronary Arteries.

5. No possible cause of the thickened Media and Intima and the contracted Lumen could be gleaned from the Notes, except as to the cause of his Periurethral Abscess, which was due to a stricture of the Urethra.

6. Blood-pressure. Not observed.

7. Lumen. $\frac{1.33.}{1.54.}$ Media. $\frac{0.313.}{0.285.}$ $\frac{0.0875.}{0.0973.}$ Intima. $\frac{.0313}{.0175}$

The Lumen is contracted and the Media thickened, i.e. the artery shows Hypertonus, but the Intima is thickened in addition.

Case.10. George.B. aged.65. Occupation.Currier.

1. The Radial Artery is fairly round. The lumen is contracted, the average diameter of the lumen being 1.2425.mm. The Media is thickened, measuring on an average 0.3405.mm. The muscle is healthy, and the vessel shows well marked fibrosis, while the elastic tissue fibres are well marked. The Adventitia is very slightly thickened, measuring 0.098.mm. The Intima is thickened and shows well marked increase of the elastic tissue elements, the average thickness is 0.032.mm.

2. The Kidneys are soft and pale. Microscopically, the capsule is seen to be thickened, with several downgrowths of fibrous tissue into the kidney tissue. There is a diffuse interstitial fibrosis of the kidney. Many of the Glomeruli are very much fibrosed, being converted into fibrous knots, while the remaining Glomeruli show a thickening of Bowman's Capsule. The Epithelium lining the tubules shows cloudy-swelling. The middle coat of the arteries of the kidney is thickened.

3. Cause of Death. Abscess of the Liver and Lung.

4. Associated Conditions. Hypertrophy of the Left Ventricle. Pericarditis. Atheroma of the Aorta, also of the Coronary and Cerebral arteries.

5. Possible causes of the thickening of the Media, and the contraction of the lumen. No possible cause found in the clinical notes. The Patient had Scarlet Fever when 2 years old, but got quite well from that.

6. Blood-pressure. Not observed.

7. Lumen. 1.2425. Media. 0.3405. Adventitia. 0.098.
 1.54. 0.285. 0.0973. Intima.
0.032.

0.0175. The Lumen is a little contracted, and the Media is thickened, the artery thus shows Hypertonus, with some thickening of the Intima.

Case.11. Charles.J. aged.44. Polisher.

1.The Radial Artery is elliptical in shape.The average diameter of the Lumen is about Standard,being,1.55.mm. The Media is thinner than Standard,and is irregular,its average thickness is,0.276.mm. The Adventitia is slightly increased,its measurement being,0.1225.mm. The Intima shows irregular thickening, its average measurement being,0.0642.mm. The thickening is seen to consist of a network of Elastic Tissue Fibres,with connective tissue cells in its meshes. Henle's Elastic Lamina is well marked.

2.The Kidneys are small and dark. The Cortex is narrowed,and the Capsule does not strip well,but leaves a granular surface. Microscopically,the Capsule is seen to be much thickened,but shows little sign of any downgrowth into the Kidney substance. There is well marked interstitial fibrosis,which has isolated areas of Kidney tissue,in which can be seen many Cysts and fibrosed Glomeruli. There is a small cell infiltration of the fibrous tissue. There is catarrh of the Epithelium in many of the Tubes,while it is desquamated in others.There is thickening of both the Media and Intima,with increase of the Elastic tissue in the latter,to be seen in the branches of the Renal Artery in the Kidney.

3.Cause of Death.An attack of Acute Nephritis in a chronically

inflamed kidney. Uraemia.

4. Associated conditions. Chronic Pericarditis. Hypertrophy of both Ventricles. Atheroma of the Aorta, and of the Coronary and Cerebral arteries. Chronic thickening of the Endocardium.

5. Possible causes for the conditions found in the Radial artery, as ascertained from the Clinical notes. Patient had been a Brass worker for 26 years. He drank and ^{ate} eat to excess. He had a black line on his gums at the margin of the teeth. The latter were very bad and decayed.

6. Blood-Pressure.

5.12.06. B.P. 240. mm. Pulse. 100. Regular. (On admission)

7.12.06. B.P. 230. mm. Epistaxis present.

9.12.06. B.P. 220. mm. Pulse. 84. Epistaxis ceased.

14.12.06. B.P. 210. mm. Pulse. 90.

17.12.06. B.P. 210. mm. Pulse. 100.

19.12.06. B.P. 235. mm. Pulse. 112.

20.12.06. B.P. 120. mm. Pulse feeble. Having clonic Convulsion.

B.P. 245. mm. Pulse stronger. (a few minutes after the last observation).

7. Lumen.	<u>1.5575.</u>	Media.	<u>0.2765.</u>	Adventitia.	<u>0.1235.</u>	Intima.	<u>0.0682.</u>
	1.54.		0.285.		0.0973.		.0175.

The lumen is of average size. There is slight thinning of the Media with compensatory thickening of the Adventitia and the Intima.

Case.12. George.M. aged.52. Cab-driver.

1.The Radial Artery is rounded and the Lumen somewhat contracted, the average diameter being, 1.4105.mm. The thickness of the Media is very irregular, some parts being only half as thick as the thicker parts. The average of six measurements is, 0.21.mm. The Adventitia is slightly less than normal, being 0.0875, mm. in thickness. The Intima shows irregular thickening, the average being 0.0575.mm.

2. The Kidneys are congested, but show no other change naked eye. Microscopically, there is seen to be slight thickening of the capsule with downgrowths into the kidney substance. Bowman's Capsule is thickened, and many of the Glomeruli are completely fibrosed. There is marked cyst formation of the tubules, the cysts containing colloid matter. The Epithelium is fairly healthy. In the larger branches of the renal artery in the kidney there appears to be little change in the relative size of the Media and Intima, but in the smaller branches, there is a considerable increase in the thickness of the intima, with increase of the elastic tissue elements, while the media is atrophied.

3.Cause of Death. Rupture of a fibrosed area at the back of the Left Ventricle of the Heart, while climbing onto the box of his Cab. (Brought in Dead to the Hospital).

4.Associated conditions. Hypertrophy, Fibrosis, and Fatty degen-

-eration of the Heart Muscle, especially of the left ventricle.
 Atheroma of the Aorta, of the Coronary arteries (with Calcareous degeneration of the Media). Atheroma of the Cerebral Arteries.

5. Possible Cause of the Arterial changes. Life as a Cabman, in which he would be exposed to all weathers, and would probably take excess of Alcohol.

6. Blood-Pressure. Patient dead on admission.

7. Lumen, <u>1.4105.</u>	Media, <u>0.21.</u>	Adventitia, <u>0.0875.</u>	Intima, <u>0.0575.</u>
1.54.	0.285.	0.0973.	0.0175.

The Lumen and the Media are both smaller than the normal. The Intima is increased in thickness.

Case.13. Eliza Cecilia.B. aged.60.

1.The Radial Atery is collapsed and flattened. The average diameter of the Lumen is 1.1265.mm. The Media is much thinner than normal only measuring, 0.1575.mm. There is some increased fibrous tissue formation in the deepest part of the Media. The Adventitia shows some very slight thickening, the measurement being 0.098.mm. The Intima shows irregular thickening, with increase of the elastic tissue elements. The average thickness is 0.0553 mm. which is about three times the normal thickness.

2.The Kidneys show an early interstitial change. Microscopically, there is seen to be considerable thickening of the capsule, with a few downgrowths of fibrous tissue into the underlying kidney tissue. There is thickening of Bowman's Capsule. The Epithelium is in a state of Catarrh. The intima of the branches of the renal artery in the kidney is increased in thickness by increase of the elastic tissue fibres.

3.Cause of Death. Cardiac Dilatation. Fatty Heart Muscle.

4.Associated Conditions. Hypertrophy and dilatation of the left Ventricle. Dilatation of the Right Ventricle of the Heart. Atheroma of the Aorta. Atheroma and thickening of the Coronary Arteries. Fine Cirrhosis of the Liver.

5.Possible cause of the thickened Intima. A history of indulgence in Alcohol frequently, was obtained.

6.Blood-Pressure. Patient was dead on admission to the Hospital,

7. Lumen, 1.1265. Media, 0.1575. Adventitia, 0.098. Intima, 0.0553.
1.54. 0.285. 0.0975. 0.0175.

The Lumen is contracted slightly. The Media is thinned. The Intima is much thickened.

Case.14. John.G. aged.47.

- 1.The Radial Artery is somewhat flattened and contracted.The average diameter \bullet is,1.076.mm. There is slight thinning of the Media,which measures 0.2677.mm. There is marked thinning of the adventitia,the average measurement being,0.049.mm. The Intima is of fairly even thickness,its average measurement being,0.028.mm.This coat is fairly healthy.
 - 2.The Kidneys show cloudy-swelling,naked eye. Microscopically, The Capsule is slightly thickened,with a few downgrowths of fibrous tissue into the kidney itself.Bowman's Capsule is thickened. The Epithelium shows cloudy-swelling,and is much desquamated. There is a slight increase of the elastic fibres of the intima in the branches of the renal artery in the kidney.
 - 3.Cause of Death.Peritonitis,following Thrombosis of the Mesenteric Vein.
 - 4.Associated conditions.Acute Endocarditis of the Mitral Valve, Atheroma of the Aorta. Cirrhosis of the Liver.
 - 5.There was no possible cause for the arterial condition to be found in the Clinical Notes.
 - 6.Blood-Pressure. Not observed.
 - 7.Lumen,1.076. Media,0.2677.Adventitia. 0.049. Intima, 0.028.
 1.54. Wall 0.285. 0.0973. 0.0175.
- The Intima is thickened. The Lumen is contracted.The Media and Adventitia are thinner than normal.

Case.15. Claude.P. aged.41. Cashier.

1.This Radial Artery is taken as my Type artery. It is fairly round. The average diameter of the lumen is,1.54.mm. The Media is fairly uniform in thickness,the average being,0.285.mm.

The Adventitia measures on an average,0.0973.mm. The Intima is of fairly even thickness,and measures 0.0175.mm.

2.The Kidney is normal.There is no thickening of the arteries in the kidney.

3.Cause of Death.Meningeal Haemorrhage from an Accident in the Street.

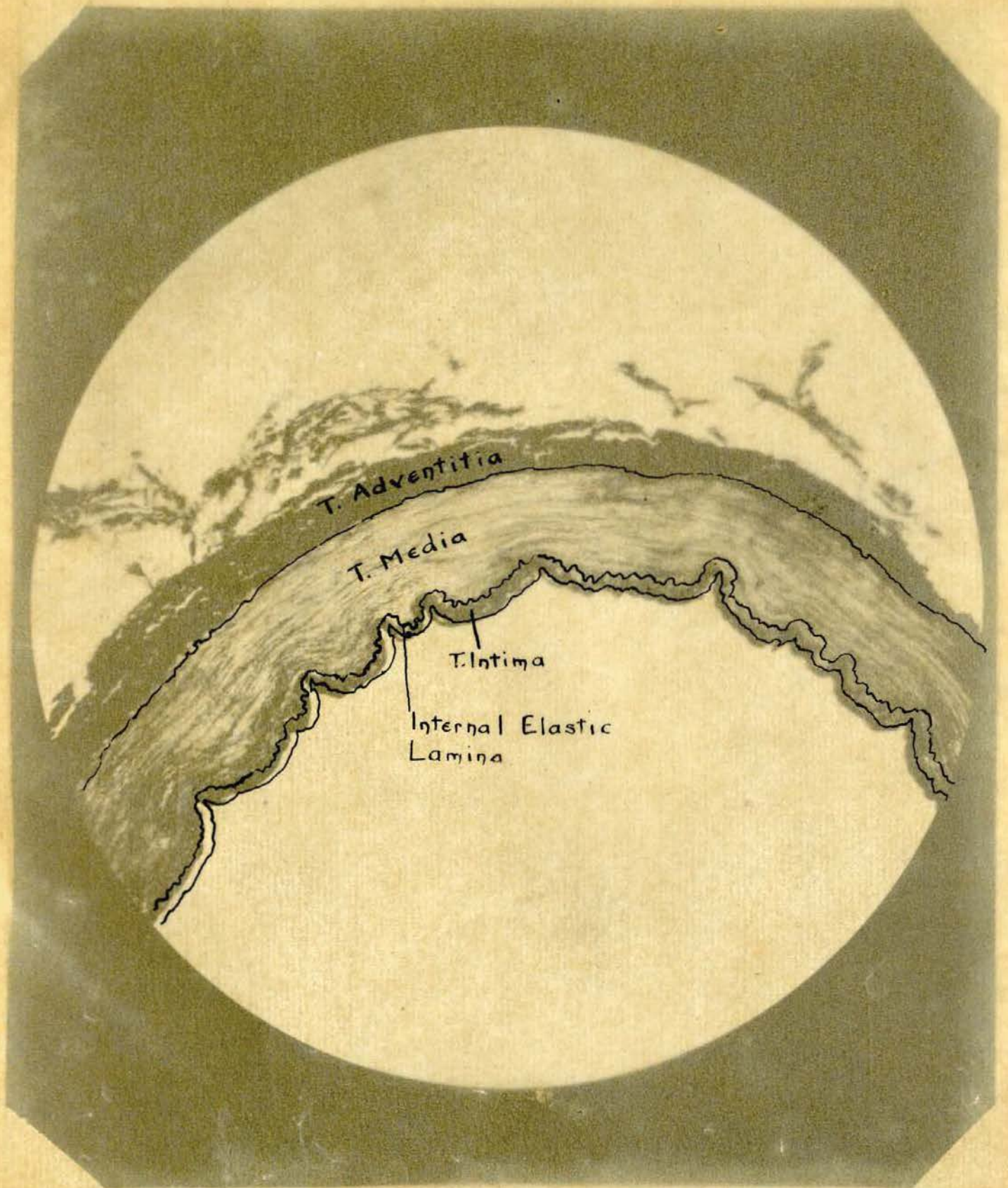
4.Associated Conditions. There was no Hypertrophy of the Heart or Atheroma found.

5.Cause of Arterial Condition. The Artery is Normal.

6.Blood-Pressure.Not observed.

7.Lumen, 1.54.mm. Media,0.285.mm. Adventitia, 0.0973.mm. Intima, 0.0175.mm.

Photomicrograph of Case. 15. The Standard or Type Artery.



The Comparative sizes of the Three Tunics can be seen. Henle's Internal Elastic Lamina is well seen.

Photomicrograph of Case.15. The Standard or Type Artery.



The Comparative sizes of the Three Tunics can be seen. Henle's¹
Internal Elastic Lamina is well seen.

Case.16. John Collins.K. aged.60. Printer.

1.The Radial Artery is somewhat flattened and contracted. The average diameter of the lumen is,1.184.mm.The Media is of fairly regular thickness,the average thickness being,0.207.mm. The Adventitia measures on an average,0.105.mm. The Intima is rather irregular in thickness,the average being,0.0569.mm.

2.The Kidneys are firm and congested,and show early interstitial change. Microscopically,there is some slight diffuse interstitial fibrosis,but it is not marked. Bowman's Capsule in some of the Glomeruli is thickened,while in others it is normal.The Epithelium shows slight Catarrh. There is congestion of the Kidney. There is no abnormality detected in the Arteries of the Kidney.(i.e.no thickening or thinning of the Tunics)

3.Cause of Death.Dilatation of the Heart.Infarct of Lung.

4.Associated Conditions.Hypertrophy and dilatation of both Ventricles of the Heart. Atheroma of the Aorta and of the Coronary Arteries.

5.Possible cause .The Patient's Father died of "Alcohol".The Patient is used to taking Rum. He does not smoke much.His work was that of a Printer.

6.Blood-Pressure. 135.mm.

7.Lumen,1.184.Media,0.207.Adventitia,0.1050. Intima, 0.0569.
1.54. 0.285. 0.0973. 0.0175.

The Lumen is contracted.There is thickening of the Adventitia and Intima ,to compensate for the Medial thinning.

Case.17. Henry.S. aged.33. Labourer.

1.The Radial Artery is slightly oval, and is contracted, the average diameter of the Lumen is, 1.0802.mm. The Media is healthy and of fairly uniform thickness, but it is slightly thinner than normal. The average measurement is, 0.225.mm. The Adventitia is 0.07.mm. in thickness. The Intima shows slight thickening, with increase in the number of the elastic tissue fibres, its average measurement is 0.0378.mm.

2.The Kidneys are large, pale and firm. The Cortex is increased in width. Microscopically, There is an interstitial fibrosis, diffusely distributed through the kidney. There is a small cell infiltration of this fibrous tissue. The Capsule is slightly thickened, as is Bowman's Capsule, in many of the Glomeruli. The Tubules vary much in size, and shape, and the epithelium lining them shows well marked fatty degeneration, with much desquamation in many of the Tubules. The branches of the Renal artery in the kidney show no special change.

3.Cause of Death. Sub-acute Nephritis. General Dropsy.

4.Associated conditions. Hypertrophy of the Left Ventricle. Atheroma of the Aorta, and of the Coronary Arteries. General effusion into the Serous spaces.

5.Possible Cause of the arterial changes. The Patient was a heavy drinker.

6.Blood-Pressure. Not Recorded.

7. Lumen, $\frac{1.0802}{1.54}$. Media, $\frac{0.225}{0.285}$. Adventitia, $\frac{0.07}{0.0973}$. Intima, $\frac{0.0378}{0.0175}$.

There is thickening of the Intima with contraction of the average diameter of the Lumen. The Media and Adventitia are both thinner than the Standard.

Case.18. Edward.S. aged.65.

1.The Radial Artery is rounded and much dilated.The average diameter of the Lumen is,2.0038.mm.The thickness of the Media is uneven(as can be seen in the Micro-Photograph,on the next page)It is extensively fibrosed,with areas of Calcareous degeneration ,which also affect the Intima.The Medial measurement is,0.216.mm. The Adventitia measures 0.0845.mm. The Intima is irregular,and shows extensive calcareous ~~degeneration~~^{Atheroma},its average measurement is 0.063.mm.

2.The Kidneys are small and Granular. Microscopically,the capsule is much thickened,with slight downgrowths into the underlying kidney tissue. Bowman's Capsule is thickened. The Kidney is congested. The Epithelium shows cloudy-swelling and desquamation. There are many Cysts seen. There is considerable thickening of the intima of the arteries in the Kidney.

3.Cause of Death.Senile Gangrene of the Leg.

4.Associated Conditions.Hypertrophy of the Left Ventricle. Atheroma of the Aorta and its branches.Atheroma of the Coronary arteries and of the Cerebral Arteries.

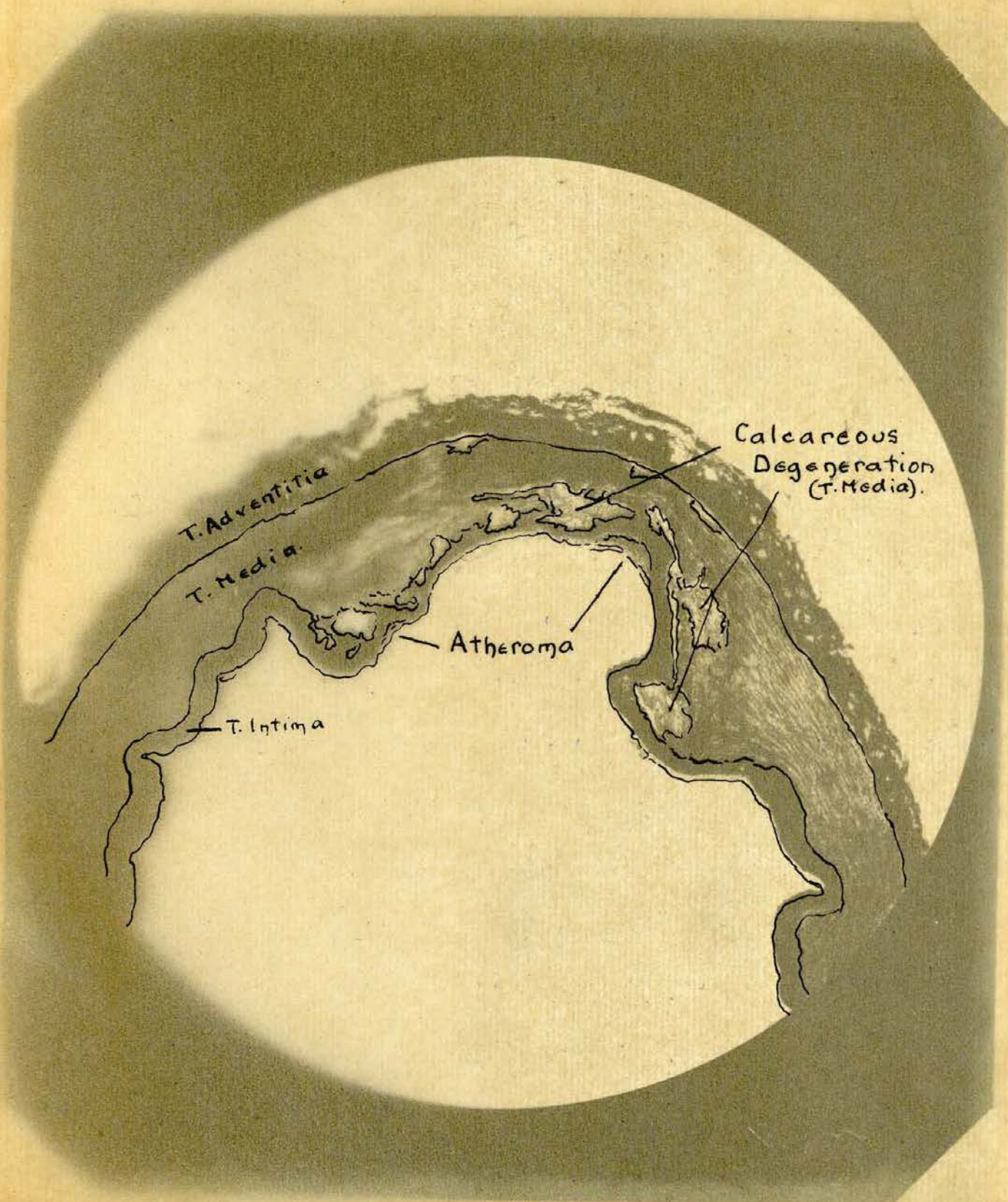
5.Possible cause of the condition.None given in the Notes.

6.Blood-Pressure. Not Recorded.

7.Lumen,2.0038. Media,0.216. Adventitia,0.0845. Intima,0.063.
1.54. 0.285. 0.0973. 0.0175.

The Lumen is much dilated. The Media shows extensive calcareous degeneration. Intima shows a similar change,With Atheroma.

Micro-Photograph of the Artery from Case.18.



The photograph shows a cross-section of the Media, with
 a large atheroma in the lumen. There is also seen a sim-
 ilar area of calcareous degeneration in the Media. The Elastic lamina not seen.

Micro-Photograph of the Artery from Case.18.



The Photograph shows Calcareous degeneration of the Media, with thinning of the coat in this region. There is also seen a similar degeneration of the Intima. Henle's Elastic lamina not seen.

Case.19. Elizabeth.H. aged.59.

1.The Radial Artery is oval in shape.The Lumen is somewhat contracted,the average diameter being,1.17.mm. The Media is thickened,and shows the presence of an excess of Fibrous tissue,especially in the internal part.The average thickness of the Media is,0.342.mm. The Adventitia is of about the ^{standard} ~~average~~ thickness,the measurement being,0.0946.mm. The Intima is irregularly thickened,with increase of the Elastic tissue elements, which has taken on the form of a network with connective tissue cells in the meshes.There is no degeneration,and the average thickness is ,0.0772.mm.

2.The Kidneys are congested,and show early fatty change in the Cortex. Microscopically,There is seen to be a slight interstitial fibrosis,with thickening of Bowman's Capsule in most of the Glomeruli.The Kidney is congested. The Epithelium lining the Tubules shows cloudy-swelling. The branches of the Renal Artery in the Kidney show a thickening of the Intima,with increase of the Elastic fibres. The Media is atrophied.

3.Cause of Death.Cerebral Haemorrhage,complicated by Burns produced by falling,and lying in Paraffin,when she became unconscious from the effects of the Cerebral Haemorrhage.

4.Associated Conditions.Hypertrophy of the Left Ventricle of the Heart. Atheroma of the Aorta,and of the Coronary and Cerebral Arteries.

5. Possible Cause of the Arterial condition. There was a history of taking excess of Alcohol.

6. Blood-Pressure. Not recorded.

7. Lumen, 1.17. Media, 0.342. Adventitia, 0.0946. Intima, 0.0772.
 1.54. 0.285. 0.0973. 0.0175.

The Lumen is contracted, and the Media thickened. The vessel shows Hypertonus. The Intima is also much thickened.

Case.20. Harry.J. aged.30.

1.The Radial Artery is somewhat flattened, and the Lumen is slightly contracted, the average diameter being, 1.125.mm. The Media is slightly thinner than the Standard, measuring 0.262.mm. The Adventitia measures on an average, 0.0805.mm. The Intima is thickened and measures 0.0455.mm. The Elastic fibres are in the form of a network.

2.The Kidneys are normal, except for a cyst in one of them, which contains calculi. Microscopically, there is very slight increase of fibrous interstitial tissue. The Kidney is congested. The Epithelium is in a state of cloudy-swelling. There is slight thickening of the Intima in the branches of the Renal Artery.

3.Cause of Death. Oedema of the Brain following an operation for a small round cell Sarcoma of the Cerebellum.

4.Associated conditions. Hypertrophied Left Ventricle of the Heart. Atheroma of the Aorta.

5. There was no possible cause for the Intimal thickening found in the Notes.

6.Blood-Pressure. Not recorded.

7. Lumen, 1.125. Media, 0.262. Adventitia, 0.0805. Intima, 0.0455.
 1.54. 0.285. 0.0973. 0.0175.

The Intima is thickened. The other measurements are less than the Standard.

Case.21. Marion.U. aged.39.

1.The Radial Artery is fairly round and the Lumen is slightly contracted,the average diameter being,1.34.mm. The Media is a little thinner than the Standard,being,0.247.mm. in thickness. The muscle is healthy. The average thickness of the Adventitia is 0.058.mm. The Intima is rather irregular in thickness,the average measurement being,0.044.mm.

2.The Kidneys naked eye only show Cloudy-swelling. Microscopic-ally,there is ~~now~~ very little fibrous tissue formation.The Epithelium lining the Tubules shows cloudy-swelling and some catarrh,and is extensively desquamated. There is slight thickening of the Intima of the branches.of the Renal Artery.

3.Cause of Death.Carbolic Acid Poisoning.

4.Associated Conditions.None to note.

5.There was no possible cause for the Intimal thickening to be found in the Notes.The Radial artery is contracted owing to the circulation of toxic substances derived from the Poison.

6.Blood-Pressure. Not recorded.

7.Lumen,1.34. Media,0.247. Adventitia,0.058. Intima,0.044.
1.54. 0.285. 0.0973. 0.0175.

Thickening of the Intima.The other measurements being less than the Standard.

Case.22. Annie.C. aged.38.

1.The Radial Artery is oval in shape.The average diameter of the lumen is 0.98.mm.The Media is very slightly thinner than the Standard.It measures 0.27.mm. The thickness of the Adventitia is,0.0805.mm.while the Intima is,0.035.mm.

2.The Kidneys show Cloudy-swelling.The Cortex is swollen and pale. Microscopically,there is no morbid change except cloudy-swelling of the Tubular Epithelium.The Arteries are normal.

3.Cause of Death.Apical Pneumonia.

4.Associated Conditions. None to note.

5.There was no possible cause given in the notes ~~of~~^{by} the[Intimal thickening.

6.Blood-Pressure. Not recorded.

7.Lumen, <u>0.98.</u>	Media, <u>0.27.</u>	Adventitia, <u>0.0805.</u>	Intima, <u>0.035.</u>
1.54.	0.285.	0.0973.	0.0175.

The Lumen is much contracted. The Intima is thickened. The Media and Adventitia are slightly thinner than the Standard.

Case. 23. Edward. L. aged. 67. Occupied at Carriage Works,

1. The Radial Artery is somewhat flattened, and the lumen is contracted, the average diameter being, 1.334. mm. The Media is thickened, measuring, 0.382. mm. The Adventitia is of standard thickness, measuring, 0.0977. mm. The Intima is much thickened, the average measurement being, 0.058. mm.

2. The Kidney shows Chronic Venous Congestion, with some early Interstitial fibrosis. The Capsule strips well. The Cortex is narrowed. Microscopically, there is seen to be slight thickening of the Capsule, with general increase of the Interstitial fibrous tissue. There is slight thickening of Bowman's Capsule and many of the Glomeruli are fibrosed and contracted. The Epithelium of the Tubules is largely desquamated. There is a thickening of the Intima and Atrophy of the Media of the branches of the Renal Artery in the Kidney.

3. Cause of Death. Myocarditis.

4. Associated Conditions. Hypertrophy of Both Ventricles of the Heart. Thickening of the Endocardium. The Aorta and the Coronary Arteries show early Atheroma.

5. Possible Cause of the Arterial condition present. The Patient worked at some Carriage works and came in contact with Lead.

6. Blood-Pressure. Not recorded.

7. Lumen, 1.334. Media, 0.382. Adventitia, 0.0977. Intima, 0.058.
 1.54. 0.285. 0.0973. 0.0175.

Hypertonus with Intimal thickening is present.

Case.24. Alfred.J. aged.29. Occupation.Waiter.

1.The Radial Artery is fairly round and much contracted, the average diameter being,1.074.mm. The Media is thickened, measuring,0.322.mm. The average thickness of the Adventitia is,.078 mm. and that of the Intima,0.0306.mm.

2.The Kidneys are small, the Cortex is narrowed, there is a deposit of fat in the Pelvis, and the capsule does not strip well but leaves a granular surface. Microscopically, there is very marked interstitial fibrosis, with downgrowth of the Capsule, into the underlying kidney tissue. Many of the Glomeruli are converted into fibrous knots, while Bowman's Capsule in the remaining Glomeruli is thickened. The Tubules show irregularity in size and shape, while the Epithelium lining them is fatty and largely desquamated. The branches of the Renal Artery in the kidney show thickening of both the Intima and Media, but more especially the latter.

3.Cause of Death.An acute attack of Nephritis, occurring in a chronically inflamed Kidney.

4.Associated Conditions. Very marked Hypertrophy of the Left Ventricle of the Heart. Albuminuric Retinitis.

5.Possible Causes of the Arterial condition found. Patient's Father had "Kidney Disease". The Patient in the course of his work ^{was} ~~was~~ in the habit of drinking at least Four Pints of Beer, and Three Whiskeys, each day. He smoked a very little.

6. Blood-Pressure. On admission, (10.12.06.). Pulse. 100. Regular,
High Tension. Vessel thickened and Prominent. B.P. 230. mm.

14.12.06. B.P. 180. mm.

17.12.06. B.P. 185. mm.

19.12.06. B.P. 190. mm.

30.12.06. B.P. 130. mm. (Had had Diarrhoea for Ten days).

13.1.07. Death.

7. Lumen, 1.074. Media, 0.322. Adventitia, 0.078. Intima, 0.0306.
1.54. Media: 0.285. 0.0973. 0.0175.

The Radial Artery is in a state of Hypertonus with Intimal
Thickening in addition.

Case.25. Ernest.H. aged.21. Occupation.Engraver.

1.The Radial Artery is nearly round in shape,and the Lumen is very much contracted,the average diameter being,0.91.mm. The Media is slightly thickened but is healthy,its average thickness is 0.291.mm. The average thickness of the Adventitia is 0.07.mm. The Intima is of fairly even thickness,but is thickened,the average measurement being,0.035.mm.

2.The Kidneys are enlarged,The Cortex is pale and fatty,and is swollen. The Pyramids are well marked. The Kidney is too small for a typical Sub-acute Nephritis. Microscopically,there is slight thickening of the Capsule. The Glomeruli are swollen. There is a marked small cell infiltration throughout the Kidney.The Epithelium lining the Tubules shows Cloudy-swelling, and fatty degeneration. The branches of the Renal Artery do not show any Morbid change.

3.Cause of Death.Gangrene of the Bowel.Peritonitis.

4.Associated Conditions.Slight Hypertrophy of the Left Ventricle of the Heart,Thickening of the Mitral Endocardium.

5.Possible Cause of the Arterial condition found. The circulation of toxins,produced by the Peritonitis,has caused a spasm of the Media,with a narrowing of the lumen as a result.

6.Blood-Pressure. Not recorded.

7.Lumen, <u>0.91.</u>	Media, <u>0.291.</u>	Adventitia, <u>0.07.</u>	Intima, <u>0.035.</u>
1.54.	0.285.	0.0973.	0.0175.

The condition is one of Hypertonus with Intimal Thickening.

Case.26. Thomas.W. aged.66. Cattle-Dealer.

1.The Radial Artery is oval and much contracted,the average diameter of the lumen is,1.094.mm. The Media is thinner than the Standard,and measures,0.198.mm. There is increased fibrous tissue formation,especially in that part of the Media just external to Henle's Internal Elastic Lamina. The Adventitia is a little thinned,the average measurement being,0.086.mm. The Intima is thickened,measuring,0.054.mm.

2.The Kidneys are small,and the surface is pale and irregular. The Cortex is pale and narrowed.The Capsule is slightly adherent. Microscopically, the capsule is seen to be thickened. There is a diffuse interstitial fibrosis of the Kidney,with thickening of Bowman's Capsule,and the conversion of many of the Glomeruli into fibrous knots. The Epithelium of the Tubules is fatty and in places much desquamated. The branches of the Renal Artery in the Kidney show considerable thickening of the Intima,while the Media is of about normal thickness.

3.Cause of Death.Chronic Nephritis with Heart Failure.

4.Associated Conditions.Hypertrophy of the Left Ventricle.

Atheroma of the Aorta,and of the Coronary and Cerebral Arteries.

5.Possible Cause of the Intimal thickening. Excess of Alcohol.

6.Blood-Pressure. 205.mm.

7.Lumen,	<u>1.094.</u>	Media,	<u>0.198.</u>	Adventitia,	<u>0.086.</u>	Intima,	<u>0.054.</u>
	1.54.		0.285.		0.0973.		0.0175.

The vessel shows a thickening of the Intima.Lumen contracted.

Case.27. Edgar.B. aged.17. Gold-refiner.

1.The Radial Artery is rounded and slightly contracted, the average diameter of the lumen being, 1.439.mm. The Media only measures 0.1125.mm. which is less than half the standard measurement. The Adventitia is, 0.07.mm. in thickness. The Intima is of exactly the same measurement as the standard Artery, 0.0175. mm. The lumen contains a clot.

2.The Kidneys are large, (6 $\frac{1}{2}$.&.6 $\frac{3}{4}$.oz.). The Cortex is swollen and mottled, with yellowish areas, between which the vessels stand out. The Capsule is not thickened, and strips easily. Microscopically, Bowman's Capsule is seen to be very slightly thickened. The Tubules vary much in size and shape, and the Epithelium lining them shows cloudy -swelling. The branches of the Renal Artery in the Kidney show no special change.

3.Cause of Death. Pleural Effusion, and sudden Heart Failure.

4.Associated Conditions. The Heart was very small. There was no Hypertrophy. There was slight early Atheroma of the Aorta and of the Coronary Arteries at their origin in the Aorta.

5.Possible Cause of the Thinning of the Media. The condition is probably congenital seeing that his Heart is very small also.

6.Blood-Pressure. Not recorded.

7. Lumen, 1.439.	Media, 0.1125.	Adventitia, 0.07.	Intima, 0.0175.
1.54.	0.285.	0.0973.	0.0175.

There is slight contraction of the diameter of the Lumen. The thinning of the Media is of interest on account of the small Heart.

Case.28. Alfred Hawes.J. aged.59. Brewer.

- 1.The Radial Artery is oval and the lumen is dilated, measuring 1.76.mm. The Media is very much thickened, its average thickness being, 0.481.mm. The Adventitia is one-tenth the thickness of the Media, being, 0.0481.mm. The Intima is irregularly thickened and measures on an average, 0.063.mm.
- 2.The Kidneys are of about normal size, ($4\frac{1}{2}$.&. $4\frac{3}{4}$.oz.). The Cortex is narrowed and shows fatty change. The Capsule strips fairly well, but leaves a granular surface. Microscopically, the capsule is seen to be slightly thickened, with downgrowth into the kidney substance. There is a diffuse interstitial fibrosis, with small cell infiltration. Bowman's Capsule is thickened, and many of the Glomeruli are converted into fibrous knots. The Epithelium lining the Tubules is desquamated. The branches of the Renal Artery in the Kidney show a very marked increase of the Intima, with increase of the Elastic tissue elements.
- 3.Cause of Death. Chronic Nephritis. Heart Failure.
- 4.Associated Conditions. Dilatation of both Ventricles. Marked Hypertrophy of the Left Ventricle, less marked of the Right. Atheroma of the Aorta, of the Pulmonary, Coronary, and Cerebral Arteries. The Coronary Artery under the Microscope is seen to be very much thickened, with very extensive atheroma. The Intima is more than three times the thickness of the media, the latter is much thinner in those parts of the vessel where the Intima is thickest and most atheromatous. The atheromatous patches are

seen to consist of a network of Fibrous tissue, with wide meshes in which is fatty matter. This is in contrast to the thickening, which is seen in the Intima of many of the vessels in my series of cases, in which the thickening is made up of an increase of the Elastic tissue elements of the Intima, which are often arranged in the form of a network, with connective tissue cells in the meshes.

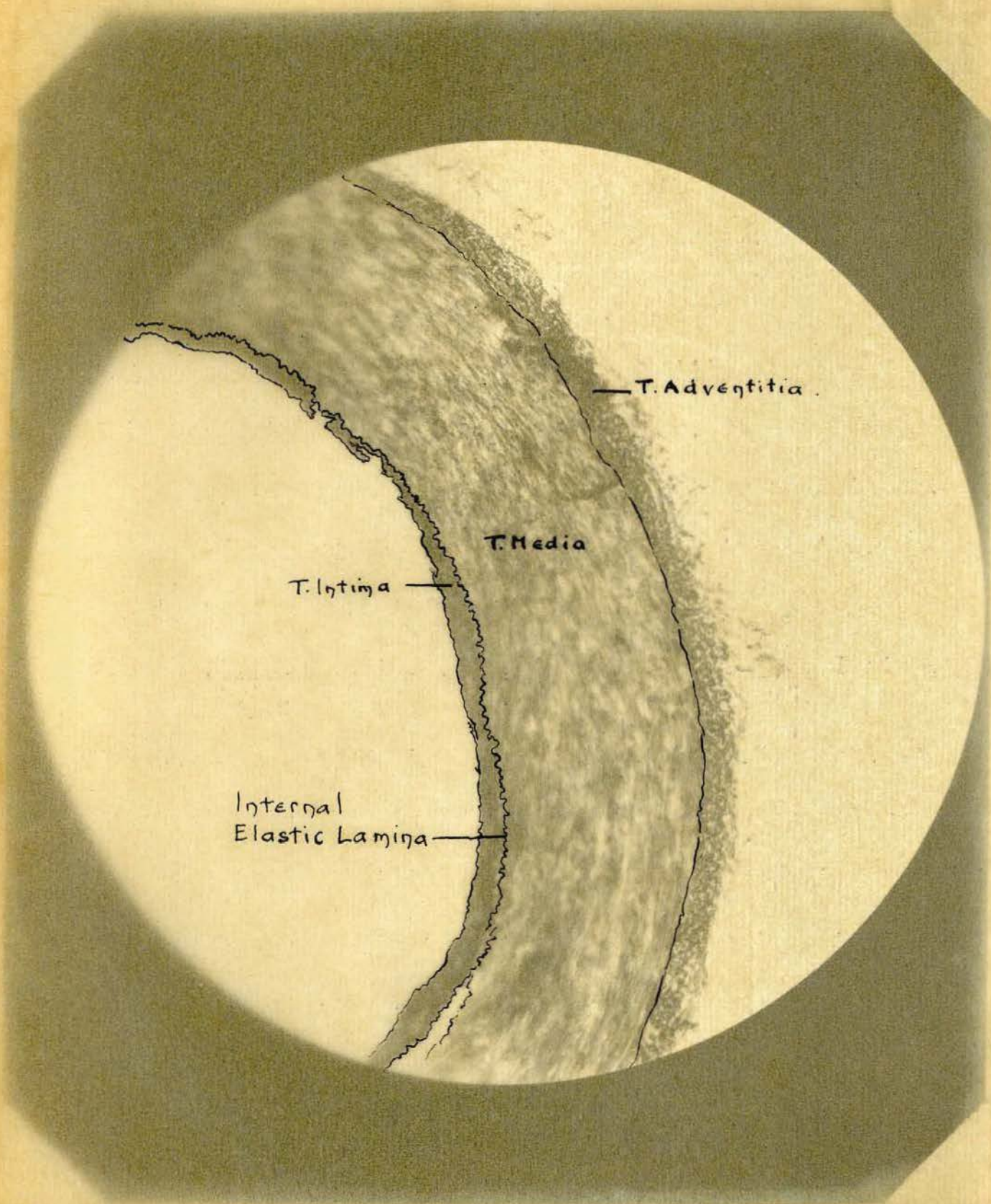
5. Possible Cause of the Arterial condition found. The Patient said on admission that he was a Brewer, but had done no work for a year. He described himself as a moderate drinker.

6. Blood-Pressure. No number is given in the notes, but there is a note to the effect that it is high.

7. Lumen, <u>1.76.</u>	Media, <u>0.481.</u>	Adventitia, <u>0.0481.</u>	Intima, <u>0.063.</u>
1.54.	0.285.	0.0973.	0.0175.

The Lumen of the Radial Artery is dilated. The Media is thickened, and is in a state of Hypermyotrophy, as described by Savill. The Adventitia is thinner than the Standard, while the Intima is thicker than both the Standard and the Adventitia of the vessel under review.

Photomicrograph of the Radial Artery of Case.28.



This is a photomicrograph of Case.15. The artery is thickened, but was thicker in a part of the vessel than is shown in the photograph. It was actually thicker than the adventitia, as it actually was

Photomicrograph of the Radial Artery of Case.28.



The Media is thickened (compare the photomicrograph of Case.15. page.37.b.) . The Intima is thickened, but was thicker in a part of the vessel which could not be shown in the photograph. It does not appear thicker than the Adventitia, as it actually was by measurement.

Case.29. John James.B. aged.67. House Painter.

1.The Radial Artery is oval in shape and is contracted, the average diameter of the lumen being, 1.15.mm. The Media shows fibrosis in places, especially in that part which is just external to Henle's internal Elastic Lamina. There is calcareous degeneration of the Tunica Media, with a patch of Atheroma in its vicinity, but Henle's Elastic Lamina intervenes between the two. The Media measures on an average, 0.215.mm. and is not thickened. The Adventitia measures, 0.0787.mm. The Intima is irregularly thickened, with a large patch of Atheroma at one point, which does not involve or encroach on the Media. The average thickness of the Intima, exclusive of the patch of Atheroma is, .0495 mm. Henle's Internal Elastic Lamina is well marked.

2.The Kidneys are large, (6.ozs). The surface is irregular. On ~~one~~ section, the organ is red and congested, the cortex is slightly narrowed, and the arteries stand out well. There is a deposit of fat in the pelvis of the Kidney. The Renal Artery is thickened and dilated. Microscopically the Capsule is not markedly thickened, and there is no downgrowth of it into the Kidney substance. There is a diffuse interstitial fibrosis of the Kidney, with thickening of Bowman's Capsule in many of the Glomeruli, whilst the remaining ones are converted into fibrous knots. The Epithelium in some of the tubules shows cloudy-swelling, while in other of the tubules, the nuclei of the cells stain well. The

vessels and Glomeruli are congested. The branches of the Renal Artery in the Kidney show thickening of the Intima and Atrophy of the Media.

3.Cause of Death. Generalised Atheroma.Heart Failure.

4.Associated Conditions.The Heart weighs 20.ozs.The Left Ventricle is hypertrophied very much. The Coronary Arteries are narrowed and their walls thickened. There is an atheromatous ulcer in one of the arteries,(descending branch), The Cusps of the Aortic Valve are thickened and atheromatous.The Aorta in its whole length and in its divisions shows atheromatous plates and ulcers. There is Atheroma of the Cerebral Arteries, and of most of the larger arteries of the body,(e.g.Popliteal.).

5.Possible Causes of the thickened Intima. The Patient was a House Painter until three years before Death.The absorption of Lead and its circulation would cause an irritation of the Intima. He had had "Muscular Rheumatism"for the last three years.

6.Blood-Pressure. 165.mm. Pulse.54.per min: The Patient died 2½ hours after admission.

7.Lumen,	<u>1.115.</u>	Media,	<u>0.215.</u>	Adventitia,	<u>0.0787.</u>	Intima,	<u>0.0495.</u>
	1.54.		0.385.		0.0973.		0.0175.

The Lumen is contracted,(atheroma present). The Intima is thickened, and in parts atheromatous. The Media is thinner than the standard.

Case. 30. Sarah. T. aged. 60.

1. The Radial Artery is oval in shape. The diameter of the Lumen is of nearly Standard size, measuring, 1.57. mm. The Media is thickened and shows some fibrosis, but not markedly so, the average thickness is, 0.308. mm. The Adventitia is of about Standard thickness, measuring, 0.0927. mm. The Intima shows a true hyperplasia, and is very thick, (the thickest of the true hyperplasias, in my series of cases), there is no degeneration, or Atheroma, the average thickness is, 0.1277. mm.

2: The Kidneys are small, ($4\frac{1}{2}$. & $4\frac{3}{4}$. ozs.) The Cortex is narrow, and there is cloudy-swelling present. Microscopically, The Capsule is much thickened, but shows no downgrowth. There is a diffuse interstitial fibrosis, with well marked small cell infiltration and catarrh of the tubular Epithelium. Bowman's Capsule is much thickened in some of the Glomeruli, while the other Glomeruli are converted into fibrous knotty points. The changes in the branches of the Renal Artery in the kidney vary with the size, in the larger branches, the chief change is thickening of the Media, while in the smaller branches it is the Intima that is thickened, and the Media is atrophied. This change is seen in the Photomicrograph on page 61.

3. Cause of Death. Cerebral Haemorrhage.

4. Associated Conditions. Hypertrophy of the Left Ventricle (the weight of the Heart was 18. ozs): Early Atheroma of the Aorta,

and of the Coronary Arteries, marked Atheroma of the Cerebral Arteries. Hyper-pyrexia at Death. (105°).

5. There was nothing ^{mentioned} in the Notes, that could have caused the arterial condition found.

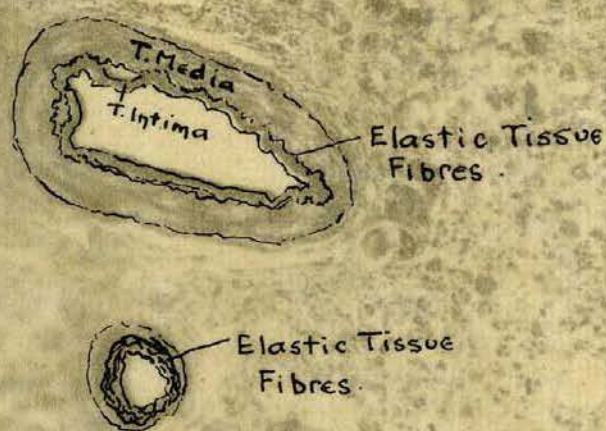
6. Blood-Pressure. 250.mm. Pulse. 120. per min. Regular. Bounding.

7. Lumen, 1.57. Media, 0.308. Adventitia, 0.0927. Intima, 0.1277.
 1.54. 0.285. 0.0973. 0.0175.

The Diameter of the Lumen is about the Standard size. The Media shows Hypermyotrophy. The Intima shows a great degree of Hyper-plasia. The Adventitia is of about Standard thickness.

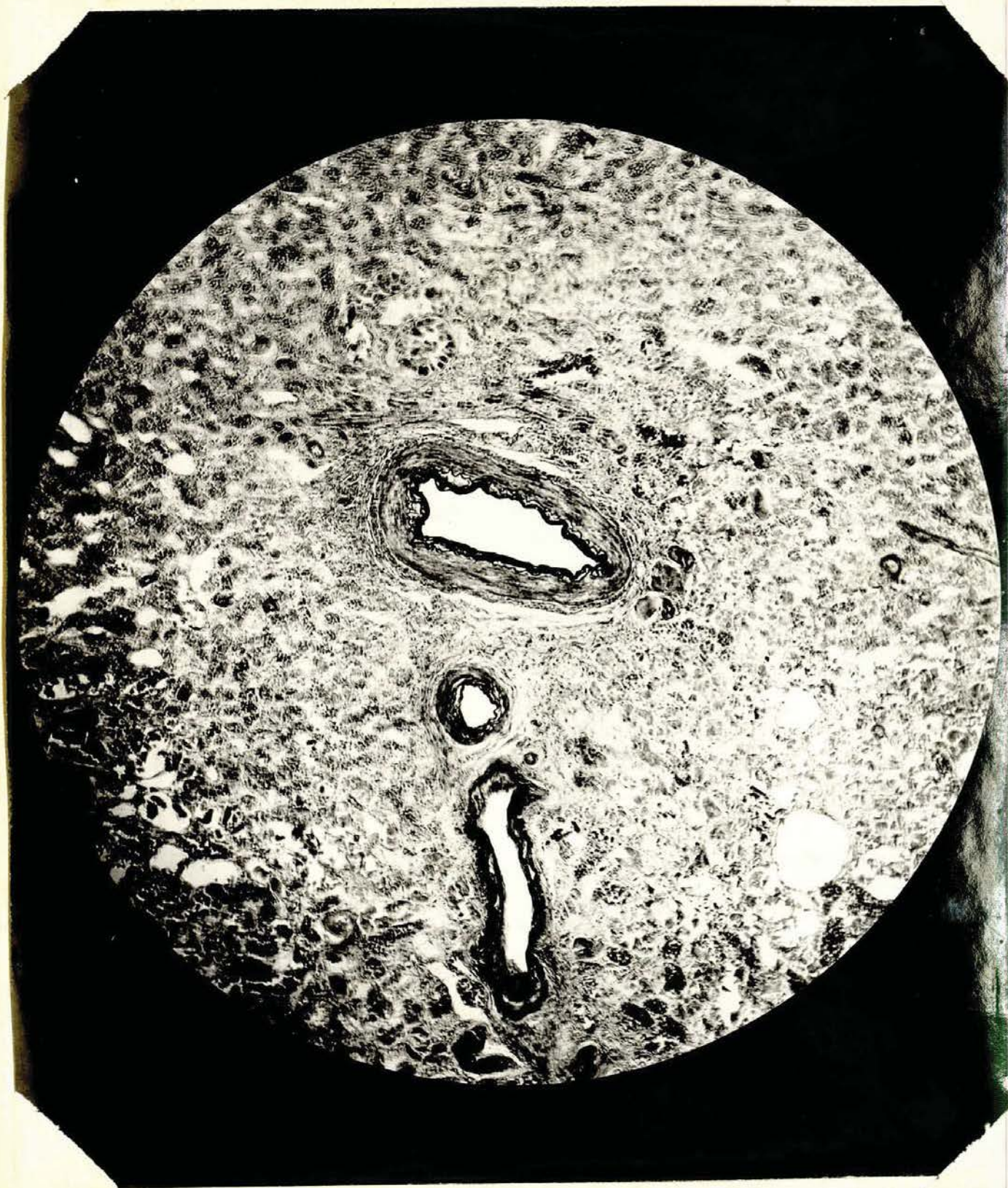
N.B. There are two Photomicrographs from this case. One shows the two sizes of the Arteries in the kidney and the change described under the heading of Kidneys on Page. 59. The other shows a portion of the Radial Artery.

Photomicrograph of The Kidney from Case. 30.



Two types of artery are seen. The upper vessel shows thickening of the Media, the Intima being also well seen. The vessel below shows thickening of the Intima with increased Elastic Tissue Fibres.

Photomicrograph of The Kidney from Case.30.



The two sizes of artery are seen. The upper vessel shows thickening of the Media, the Intima being also well seen. The vessel immediately below shows thickening of the Intima with increase of the Elastic tissue fibres.

Photomicrograph of the Radial Artery from Case, 30.



The Media is seen to be irregularly thickened (Arteriosclerosis). The Intima is seen to be much thickened. Wall's Elastic Lamina is well seen, as a wavy line between the Media and Intima.

Photomicrograph of the Radial Artery from Case.30.



The Media is seen to be irregularly thickened (Hypermyotrophy). The Intima is seen to be much thickened. Henle's Elastic Lamina is well seen, as a wavy line between the Media and Intima.

Case.31. Septimus.K. aged.45. Pipe Fitter.

1.The Radial Artery is fairly round.The Lumen is contracted, the average diameter being,1.339.mm. The Media is thickened and shows some fibrosis,the average thickness is,0.335.mm. The Adventitia measures on an average,0.0962.mm.,being of about the Standard thickness. The Intima is much thickened,and shows an increase of the Elastic Tissue,which is in the form of a network with connective tissue cells in the meshes.The average thickness of the Intima is,0.063.mm.

2.The Kidneys are large and congested,with thickened Cortex. Microscopically,the Capsule is slightly thickened,but shows no sign of any downgrowth.There is a general diffuse interstitial fibrosis,but not in a marked degree. Bowman's Capsule is thickened.The Glomeruli are congested. The Tubular Epithelium is swollen and shows signs of catarrh. The branches of the Renal Artery in the Kidney,show a thickening of the Intima with increase of the Elastic Tissue.There is slight atrophy of the Media,but the changes are not very marked.

3.Cause of Death. Aortic Disease.Cardiac Failure.Angina .

4.Associated conditions. Marked Hypertrophy of the Left Ventricle of the Heart. Atheroma of the Aorta,of its valves,and of the Coronary arteries,the latter being very marked. He had severe Angina Pectoris during life,and died in an attack.

5.Possible causes of the Arterial condition found. The Patient's

Father died of a "Stroke". The Patient was in Africa for Three years, and was in the Army Eight and a half years. He had Rheumatic and Enteric Fevers. He was in the habit of taking four to five pints of beer a day, but did not take any spirits until towards the end of his illness. He smoked about four ounces of Tobacco a week. In his occupation he used Lead.

6. Blood-Pressure. Pressure on admission was 180.mm. After treatment with Potassium Nitrite, and Trinitrin, the Pressure fell to 155.mm. He had frequent Anginal attacks in Hospital.

7. Lumen, 1.339. Media, 0.335. Adventitia, 0.0962. Intima, 0.063.
 1.54. 0.285. 0.0973. 0.0175.

The Condition of the Radial Artery is one of Hypertonus, with Intimal thickening.

Case.32. Frederick.A. aged.28. Railway Porter.

1.The Radial Artery is oval and the Lumen is contracted, the average diameter being,1.321.mm. The Media is healthy, but slightly thicker than the Standard, it measures,0.304.mm. The Adventitia is thickened, measuring on an average,0.1127.mm. The Intima is slightly irregular in thickness, measuring on an average,0.0509.mm.

2.The Kidneys are large.The Cortex is narrow and mottled.The Capsule strips fairly well, but leaves a granular surface, with well marked venae stellatae. Microscopically, the Capsule is not thickened. There is no increase of fibrous tissue. The Epithelium lining the tubules shows cloudy-swelling, with much catarrh. The Intima of the arteries in the kidney is thickened.

3.Cause of Death. Acute ascending Nephritis, following an operation for relief of Extroversion of the Bladder.

4.Associated conditions, found P.M. Hypertrophy of the Left Ventricle of the Heart.

5. There is no note of anything in the History, that could have produced the Arterial condition found, except his work.

6.Blood-Pressure . Not recorded.

7. Lumen, 1.321. Media, 0.304. Adventitia, 0.1127. Intima, 0.0509.
1.54. 0.285. 0.0973. 0.0175.

The Condition present is one of Hypertonus, with marked Intimal and Adventitial thickening.

Case.33. Louisa.S. aged,37.

1.The Radial Artery is oval in shape.The average diameter of the Lumen is,1.15.mm. The Media is healthy,but thinner than the Standard,the average measurement is,0.214.mm. The Adventitia measures on an average,0.0525.mm. The Intima is regular in thickness,the average being,0.0203.mm.

2.The Kidneys are enlarged and show chronic Venous congestion. The Cortex is pale. Microscopically,the Capsule is slightly thickened.There is a slight diffuse interstitial fibrosis,with small cell infiltration. Bowman's Capsule is slightly thickened,while the Glomeruli are congested. The Epithelium lining the Tubules shows Cloudy-swelling,fatty change and some catarrh. There is thickening of the Intima of the arteries of the Kidney.

3.Cause of Death.Mitral Stenosis,complicated by Pregnancy.

4.Associated Conditions.Hypertrophy of the Right Ventricle,not of the Left. "Button-hole" Mitral valve.

5.Cause of the Arterial changes. No cause found.

6.Blood-Pressure.Not recorded.

7.Lumen,1.15. Media,0.214. Adventitia,0.0525. Intima,0.0203.
 1.54. 0.285. 0.0973. 0.0175.

There is slight thickening of the Intima,but all the other measurements are smaller than the Standard ones,probably on account of the sex of the Patient.

Case.34. Kate.J. aged.30. Varnisher.

1.The Radial Artery is oval in shape.The Lumen is contracted, the average diameter being,1.106.mm. The Media is healthy,but is diminished in thickness,its average measurement being,.236. mm. The average thickness of the Adventitia is,0.056.mm. The Intima shows some irregular thickening,but no Atheroma,its average thickness is,0.035.mm.The Artery was described as firm and cord like,nine and a half hours before death took place.

2.The Kidneys are of about normal size($5\frac{1}{2}$ & $4\frac{1}{2}$ ozs).The Cortex is narrow and shows fatty change.The Capsule strips fairly well. Microscopically,The Capsule is thickened as is Bowman's Capsule. There is marked congestion of the Kidney. The Epithelium lining the Tubules shows cloudy-swelling and fatty degeneration, and much of it is desquamated.The Arteries of the Kidney appear normal.

3.Cause of Death.Peritonitis,following an operation for Pyloric Stenosis.

4.Associated Conditions.Hypertrophy of the Left Ventricle of the Heart. Fatty Atheroma of the Aorta.

5.Cause of the Arterial condition found.The Peritonitis caused a Spasm of the Artery^(Toxins),hence the contraction of the Lumen. The possible cause of the Intimal thickening is found in her work.

6.Blood-Pressure. 150.mm.

7.Lumen,1.106. Media,0.236. Adventitia,0.056. Intima,0.035.
1.54. 0.285. 0.0973. 0.0175.

Intima thickened.Lumen contracted.

Case. 35. Charles. S. aged. 76.

1. The Radial Artery is oval in shape, and appears to have very thick walls. The Lumen is contracted, the average diameter being 1.36. mm. The Media is thickened and shows well marked fibrous tissue formation, the average thickness is, 0.385. mm. The average thickness of the Adventitia is, 0.098. mm. The Intima shows a good deal of irregular thickening, the elastic tissue being in excess and arranged in the form of a network with connective tissue cells in the meshes, its average thickness is, 0.078. mm. There is no degeneration of the Intima.

2. The Kidneys (6. & 4 $\frac{1}{2}$. ozs), show Cloudy-swelling. Microscopically, the Capsule is seen to be thickened, with extensive down-growths into the Kidney substance. There is a general diffuse interstitial fibrosis, including thickening of Bowman's Capsule, and fibrosis of many of the Glomeruli. There is also marked congestion of the organ. The Epithelium is largely desquamated, and shows cloudy-swelling, with some fatty degeneration. The Intima of the branches of the Renal Artery in the Kidney is thickened, while the Media is atrophied.

3. Cause of Death. Hypostatic Pneumonia, following Prostatectomy for acute retention of Urine.

4. Associated Conditions. The Heart (12 $\frac{1}{2}$. ozs.) shows fatty degeneration of the Muscle, with dilatation of the chambers. There is slight hypertrophy of the Left Ventricle. There is marked

Atheroma of the Aorta, especially at the orifices of the Coronary Arteries.

5. There is no note of any condition, which would produce the arterial condition found, except the circulation of poisonous substances from diminished excretion by the Granular Kidney.

6. Blood-Pressure. Not recorded.

7. Lumen, <u>1.36.</u>	Media, <u>0.385.</u>	Adventitia, <u>0.098.</u>	Intima, <u>0.078.</u>
1.54.	0.285.	0.0973.	0.0175.

The Condition is one of Hypertonus, with Intimal sclerosis.

Case. 36. John. F. aged. 52. Plumber, &. Book-maker.

1. The Radial Artery is small, fairly round in shape, and its walls appear thickened. The Lumen is contracted in a very marked degree, the average diameter being, 0.897. mm. The Media is thickened and shows marked fibrosis, as well as well marked elastic tissue fibres, which appear wavy. The average thickness of the Media is, 0.312 mm. The Adventitia is 0.0489. mm. thick. The Intima is thickened, with increase of the elastic tissue fibres which are arranged in the form of a network, and is 0.084. mm. in average thickness.

2. The Kidneys are small ($3\frac{1}{2}$. & $4\frac{1}{2}$. ozs.). The Capsule is thickened and adherent. The Cortex is much narrowed. There is a deposit of fat in the pelvis. The arteries appear thickened. Microscopically, the Capsule is found to be thickened, with numerous down-growths into the Kidney substance, which show a small cell infiltration. There is a general diffuse interstitial fibrosis, with thickening of Bowman's Capsule, which has gone on to occlusion of many of the Glomeruli. There is marked congestion of the Kidney, and the Epithelium lining the Tubules is desquamated. The smaller branches of the Renal Artery show a thickening of the Intima, with atrophy of the Media.

3. Cause of Death. Pontine Haemorrhage. Chronic Nephritis.

4. Associated Conditions. Hypertrophy of the Left Ventricle of the Heart. Recent Pericarditis. Early fatty Atheroma of the Aorta,

and of the Coronary Arteries.

5. Cause of the Arterial Condition found. Alcohol and Lead.

6. Blood-Pressure. Not recorded, patient was dying on admission.

7. Lumen, <u>0.897.</u>	Media, <u>0.312.</u>	Adventitia, <u>0.084.</u>	Intima, <u>0.0489.</u>
1.54.	0.285.	0.0973.	0.0175.

The Condition present is Hypertonus, with Intimal thickening.

Case. 37. Susan. D. aged. 36.

1. The Radial Artery is oval in shape, and the Lumen is much contracted, the average diameter of the Lumen being, 0.85. mm. The Media is thickened, the average measurement being, 0.294. mm. The Adventitia is 0.075. mm. in thickness. The Intima is irregularly thickened, the average thickness being, 0.0437. mm. There is an increase of fibrous tissue in the most internal part of the Media. Henle's Internal Elastic Lamina is well seen.

2. The Kidneys (5. ozs), show Cloudy-swelling. The Capsule is slightly adherent. Microscopically, the Capsule is found to be thickened. There is a slight increase of the fibrous tissue of the Kidney. Bowman's Capsule is a little thicker than normal. The Tubular Epithelium shows cloudy-swelling, and is in places very desquamated. The Arteries of the Kidney show no special change.

3. Cause of Death. Ruptured Duodenum. Peritonitis, following injury.

4. Associated Conditions. The Heart (10. ozs), shows Hypertrophy of the Left Ventricle. There is nodular Atheroma of the Aorta.

5. Cause of the Arterial condition found. The Lumen is probably contracted on account of the Peritonitis producing Toxins, which circulating cause a spasm of the Artery, with a view to cutting off the toxin from the tissues. The Intimal thickening is due to the excess of Alcohol, which the Patient indulged in.

6. Blood-Pressure. Not recorded.

7. Lumen, 0.85. Media, 0.294. Adventitia, 0.075. Intima, 0.0437.
 1.54. 0.285. 0.0973. 0.0175.

Hyperconus. Intimal thickening.

Case.38. Elijah.C. aged.59. Engine Driver.

1.The Radial Artery is oval in shape, and does not appear thick to the naked eye. The average diameter of the lumen is contracted the measurement being, 1.46.mm. The Media is thinner than the Standard and shows well marked fibrosis, the average thickness is, 0.2302.mm. The Adventitia measures, 0.07.mm. The Intima is much thickened, with increase of the elastic fibres, the average thickness is, 0.0612.mm. Henle's Lamina is well seen.

2.The Kidneys are small. The Cortex is narrowed and congested. There is a deposit of fat in the Pelvis. The Capsule is slightly adherent. The Right Kidney shows the presence of more fibrous tissue than ^{does} the Left. Microscopically, the Capsule is seen to be thickened. There is a general diffuse interstitial fibrosis, including thickening of Bowman's Capsule and sclerosis of many of the Glomeruli. The Epithelium in many of the Tubules is desquamated. There is marked congestion of the organ. The branches of the Renal Artery show increased thickness of the Intima.

3.Cause of Death. Cerebral Haemorrhage.

4.Associated Conditions. The Heart (13½.ozs.), shows Hypertrophy of the Left Ventricle. There is Atheroma of the Aorta, and less marked Atheroma of the Cerebral vessels.

5.Cause of the thickening of the Intima. The Strain of his work,

6.Blood-Pressure. 170.mm. (5.hours before Death took place).

7.Lumen,	1.46.	Media,	0.2302.	Adventitia,	0.07.	Intima,	0.0612.
	1.54.		0.385.		0.0973.		0.0175.

Intimal Thickening.

Case, 39. Charles. T. aged. 48. Time-Keeper.

1. The Radial Artery is rounded, and the Lumen is contracted, the average diameter being, 1.07. mm. The Media is not so thick as the Standard, measuring, 0.378. mm. The Adventitia measures, 0.0928. mm, which is about the same as the Standard. The Intima is thickened irregularly, with increase of the Elastic tissue elements, the tunic is 0.0569. mm. in thickness.

2. The Kidneys are large ($7\frac{1}{2}$. & $5\frac{1}{2}$. ozs), pale, and fatty. Microscopically, there is slight thickening of the Capsule, with slight general interstitial fibrosis. Bowman's Capsule is thickened, and many of the Glomeruli are sclerosed. There is cloudy-swelling of the Tubular Epithelium, which in places has gone on to fatty degeneration. The Intima of the branches of the Renal Artery in the Kidney is thickened, while the Media is normal.

3. Cause of Death. Tubercular Osteo-Myelitis. Subacute Nephritis.

4. Associated Conditions. There is a slight Hypertrophy of the Left Ventricle. There is early Atheroma of the Aorta, and more marked Atheroma of the Coronary Arteries.

5. Possible cause of the Intimal thickening. The circulation of toxic matter absorbed from the focus of Osteo-myelitis.

6. Blood-Pressure. Not recorded.

7. Lumen, 1.07. Media, 0.375. Adventitia, 0.0928. Intima, 0.0569.
 1.54. 0.285. 0.0973. 0.0175.

The condition present is Intimal Thickening, with contracted Lumen.

Case.40. Frederick.F. aged.60. Saddle Maker.

1.The Radial Artery is oval in shape.The Lumen is of about the Standard size,measuring,1.55.mm. The Media is of nearly the Standard thickness,being,0.271.mm.in thickness.There is an excess of fibrous tissue in the Media. The Adventitia measures, 0.07.mm. in thickness. The Intima is very much thickened,but regular.There is an increase of the Elastic tissue,the average thickness is,0.102.mm.

2.The Kidneys are small (5.ozs).There is narrowing of the Cortex,with fatty degeneration,and injection of vessels.There is a deposit of fat in the Pelvis.The Capsule does not strip well. Microscopically,the Capsule is thickened,with downgrowths into the Kidney substance,which show a small cell infiltration.Bowman's Capsule is thickened,and some of the Glomeruli show signs of commencing fibrosis.The Epithelium lining the Tubules shows acute Catarrh. The Branches of the Renal Artery in the Kidney, show an increase in the thickness of the Intima,while the Media can scarcely be seen.

3.Cause of Death. Double Pleuro-Pneumonia.

4.Associated Conditions. Hypertrophy of the Left Ventricle of the Heart.Marked Atheroma of the Aorta,and of the Coronary Arteries especially at their origin in the Aorta.The Coronary arteries also show such marked calcareous degeneration,that they snap across,with a sound like breaking a clay Pipe.

5. The only possible cause that could be found of the Intimal thickening, was the work of the Patient.

6. Blood-Pressure. 150.mm.

7. Lumen, 1.55. Media, 0.271. Adventitia, 0.07. Intima, 0.102.
 1.54. 0.285. 0.0973. 0.0175.

The condition present is Intimal Sclerosis, with thinning of Media (slight), and of the Adventitia (slightly more marked).

Case.41. Ann.S. aged.42.

~~76.~~

1.The Radial Artery is rounded and contracted,the average diameter of the Lumen is,0.81.mm. The Media is slightly thickened,the average measurement being,0.293.mm. The Adventitia measures,0.085.mm. on an average. The Intima is thickened,somewhat irregularly,the average being,0.032.mm.

2.The Kidneys are large and pale. Microscopically,there is very slight thickening of the Capsule. Bowman's Capsule is also thickened.The Epithelium lining the Tubules shows fatty degeneration,and the tubules themselves vary much in size. There is slight thickening of the Intima of the arteries .

3.Cause of Death,General Peritonitis.

4.Associated Conditions. Hypertrophy of the Left Ventricle of the Heart.Advanced Atheroma of the Aorta,and of the Coronary Arteries.Chronic Cystitis.

5.The cause of the Arterial condition found. The Lumen is contracted owing to the circulating toxins absorbed from the inflamed Peritoneum,causing a spasm of the Vessel.The slight thickening of the Media is due to the contraction of the muscle.

6.Blood-Pressure. Not recorded.

7.Lumen,0.81. Media,0.291. Adventitia,0.085. Intima,0.032.
1.54. 0.285. 0.0973. 0.0175.

The Condition is one of slight Hypertonus,with slight Intimal thickening. The Lumen is markedly contracted owing to the Peritonitis.

Case.42. John.B. aged.68. Retired Engine Driver.

1.The Radial Artery is small and round and the Lumen is very much contracted,the average diameter being,0.71.mm. The Media is much thickened and fibrosed,and shows one or two patches of commencing calcareous degeneration,the average thickness is, 0.446.mm. The Adventitia is thickened,measuring,0.1015.mm. The Intima is thickened,but not degenerated,the average thickness is,0.0613.mm.

2.The Kidneys differ very much from one another.The Right (7½ ozs.) is red. There is little difference between the Medulla and Cortex,the former being much thinned,although the Kidney is large.The vessels stand out and appear thickened, The Left is small,and is surrounded by 1½.inches of firmly adherent and fibrosed fat.The Kidney is much sclerosed and shrunken.There was a small stone found in a dilated and cystic tubule.The artery going to the Right kidney is much larger than the one to the left,the latter being very narrow and atheromatous,especially at its origin. Microscopically,the Right Kidney shows only slight increase of Fibrous tissue,and slight thickening of Bowman's Capsule.The Tubular Epithelium is swollen and much is desquamated. The branches of the Renal Artery in this kidney show a great thickening of the Intima,with increase of the Elastic tissue,while the Media is almost disappeared.The Left Kidney microscopically,shows a very much thickened Capsule with a very extensive diffuse interstitial fibrosis. Bowman's

Capsule is very thick, and many of the Glomeruli are converted into fibrotic knots. The Tubular Epithelium is desquamated, and many of the Tubules are dilated and Cystic and contain Colloid casts. The Lumen of the Branches of the Renal Artery in the Kidney is very much narrowed by great Intimal thickening.

3. Cause of Death. Cardiac Failure following an Operation for the removal of Epitheliomata and Gummata of the Tongue.

4. Associated Conditions. Hypertrophy of the Left Ventricle of the Heart. Very extensive Atheroma of the Aorta, and Coronary Arteries, with calcareous degeneration in the latter, causing a condition of "Pipe-stem Arteries". There was also Atheroma of the Cerebral vessels, and Perihepatitis and Perisplenitis.

5. Cause of the Arterial Condition. Syphilis. Engine-driving.

6. Blood-Pressure. Not recorded.

7. Lumen, 0.71. Media, 0.446. Adventitia, 0.1015. Intima, 0.0612.
 1.54. 0.285. 0.0973. 0.0175.

The Condition present is very marked Hypertonus., but there is in addition marked sclerosis of the Adventitia and Intima, probably of Syphilitic origin.

Case.43. Arthur.W. aged.52.

1.The Radial Artery is fairly round and has thickened walls.

The average diameter of the Lumen is contracted,being,1.25.mm.

The Media is thickened and fibrosed,its average thickness being,

0.385.mm. The Adventitia has an average measurement of,0.0752.

mm.There is thickening of the Intima with increase of the Elastic tissue fibres,which are arranged in the form of a network.

The average thickness of the Intima is,0.1077.mm.

2.The Kidneys are small.The Capsule strips,leaving a granular

surface. The Cortex is narrowed,and there is a deposit of Fat

in the Pelvis. Microscopically,the Capsule is seen to be thick-

-ened. There is a diffuse interstitial fibrosis,with thicken-

-ing of Bowman's Capsule and sclerosis of many of the Glomer-

-uli. The Tubular Epithelium is desquamated. There is a marked

change in the Intima of the branches of the Renal Artery in the

the Kidney,many of the arteries being nearly obliterated by

the thickening present. The Media is much atrophied.

3.Cause of Death,Empyema. Chronic Nephritis.

4.Associated Conditions. Hypertrophy of the Left Ventricle.

Patchy Atheroma of the Aorta and also of the Coronary Arteries.

5.Cause of the Intimal thickening. Probably due only in a small

degree to the circulation of the Toxins from the Empyema.

6.Blood-Pressure. Not recorded.

7. Lumen, $\frac{1.25}{1.54}$. Media, $\frac{0.385}{0.285}$. Adventitia, $\frac{0.0752}{0.0973}$. Intima, $\frac{0.1077}{0.0175}$.

The Condition present is one of Hypertonus with marked Intimal thickening.

Case.44. James.M. aged.52 Gardener.

1.The Radial Artery is oval in shape.The average diameter of the Lumen is,1.52.mm. The Media is thinner than the Standard, and shows fibrosis,its average thickness is,0.221.mm. There is slight thinning of the Adventitia also,the average measurement being,0.0831.mm. There is irregular thickening of the Intima, it being thicker where the Media is thinner and vice-versa, thus it gives the impression of being to some extent compensatory,its average thickness is,0.0481.mm.

2.The Kidneys are small and congested. The Capsule is fairly adherent.Microscopically,there is a slight thickening of the Capsule,with thickening of Bowman's Capsule in some of the Glomeruli and sclerosis of many others. There is a slight degree of general interstitial fibrosis. The Tubular Epithelium is desquamated. There is Intimal thickening in the arteries.

3.Cause of Death. Uraemia. Cerebral Softening.

4.Associated Conditions. Hypertrophy of the Left Ventricle of the Heart. Atheroma of the Aorta and of the Coronary Arteries. Thickening of the Radial Artery clinically.

5.Possible Cause of the Arterial Condition. The Intimal thickening is in part due to compensatory thickening,owing to the thinning of the Media,but is also in part due to the frequent taking of Alcohol.

6.Blood-Pressure. (see next page)

4.6.07. On admission. B.P.189.mm. Pulse.96.per min:.

5.6.07. 9.20.A.M. B.P.152.mm. Pulse.80.per min:.

9.50.A.M. B.P.156.mm. Pulse.100.(After bleeding)

8.6.07. 9.30.A.M. B.P.170.mm. Pulse.108.

9.58.A.M. B.P.210.mm. Pulse.132.(After bleeding)

10.3.A.M. B.P.188.mm. Pulse.138.

9.6.07. 7.35.P.M. B.P.158.mm. Pulse.100.

11.6.07. The Patient died from Heart Failure.

7.Lumen,	<u>1.52.</u>	Media,	<u>0.221.</u>	Adventitia,	<u>0.0831.</u>	Intima,	<u>0.0481.</u>
	1.54.		0.285.		0.0973.		0.0175.

The Lumen is about the Standard size. There is thinning of the Media with compensatory thickening of the Intima.

Case. 45. James. D. aged. 68. Engineer.

1. The Radial Artery is oval in shape. The Lumen is contracted, the average diameter being, 1.12. mm. The Media is thinner than the Standard, and shows marked fibrosis, the average thickness is, 0.201. mm. The Adventitia measures on an average, 0.063. mm. The Intima is thickened, and regular, the average thickness is, 0.035. mm.

2. The Kidneys differ in size. (Right. 8. ozs. Left. 4. ozs.) .

Microscopically, there is seen to be slight thickening of the Capsule, with downgrowth into the Kidney substance, giving rise to cyst formation. There is a general diffuse interstitial fibrosis, with thickening of Bowman's Capsule, and sclerosis of several of the Glomeruli. The remaining Glomeruli are congested. The Tubular Epithelium is desquamated. The branches of the Renal Artery show a thickening of the Intima with increase of the Elastic tissue elements.

3. Cause of Death. Heart Failure, in attempting to leave the Hospital against advice.

4. Associated Conditions. Chronic Pericarditis. Slight Hypertrophy of the Left Ventricle of the Heart. Atheroma of the Aorta, and sclerosis of the Coronary Arteries, with the formation of calcareous plates near their orifices ⁱⁿ ~~from~~ the Aorta.

5. Possible causes of the Arterial Condition found. The Patient was a Publican, and took Rum, Whiskey and Beer to excess. He also

smoked 4 ounces of Tobacco a week.

6. Blood-Pressure. Not recorded.

7. Lumen, <u>1.12.</u>	Media, <u>0.201.</u>	Adventitia, <u>0.063.</u>	Intima, <u>0.035.</u>
1.54.	0.285.	0.0973.	0.0175.

The Condition present is Intimal Thickening, with contraction of the Lumen, and thinning of the Media and Adventitia.

Case.46. Edwin.H. aged.21.

- 1.The Radial Artery is round,and the Lumen is contracted,the average diameter being,1.06.mm. The Media is slightly thickened,measuring,0.238.mm. The Adventitia is thinner than the Standard,measuring,0.0525.mm. The Intima is fairly regular in thickness,the average measurement being,0.0203.mm.
 - 2.The Kidneys are large.The Cortex is pale,while the Medulla is red and congested and stands out in marked contrast. There are numerous Cysts. The Capsule is non-adherent. Microscopically,the Capsule is not thickened,and there is only a very slight degree of general interstitial fibrosis,and thickening of Bowman's Capsule,and sclerosis of very few of the Glomeruli. The Pyramids are congested,and there are one or two Cysts seen. The Tubular Epithelium is largely desquamated and Fatty. There is thickening of the Intima of the branches of the Renal Artery,with increase of the Elastic fibres.
 - 3.Cause of Death. Sub-acute Nephritis. Oedema of the Lungs.
 - 4.Associated Conditions. There is slight Hypertrophy of the Left Ventricle of the Heart,with recent Pericarditis.
 - 5.Cause of the Arterial condition.Deficient excretion of toxic matters as the result of the Nephritis.
 - 6.Blood-Pressure. No record,as the oedema too much.
 - 7.Lumen,1.06. Media,0.238. Adventitia,0.0525. Intima,0.0203.
 1.54 0.235. 0.0973. 0.0175.
- The condition is one of slight Hypertonus,and Intimal thickening.

Case. 47. Amelia. G. aged. 64.

1. The Radial Artery is flattened, and the Lumen is slightly dilated, the average diameter being, 1.63. mm. The Media is thickened, and markedly fibrosed, the average thickness is, 0.31. mm. The Adventitia is thickened, the average measurement being, .1078. mm. The Intima is somewhat irregularly thickened, measuring on an average, 0.0425. mm.

2. The Kidneys are small. The Cortex is narrow. The Capsule is adherent, and leaves a granular surface. There are some Cysts seen, and there is a deposit of fat in the Pelvis. Microscopically, the Capsule is seen to be thickened, with some downgrowth into the Kidney substance. The fibrous tissue is infiltrated with small cells. There is a general diffuse interstitial fibrosis. Bowman's Capsule is thickened, and many of the Glomeruli are fibrosed. The Tubular Epithelium is catarrhal. There is a thickening of the Intima and atrophy of the Media of the branches of the Renal Artery in the Kidney.

3. Cause of Death. Pontine Haemorrhage.

4. Associated Conditions. There was hypertrophy of the Left Ventricle. (There was not a complete examination of the Body)

5. Possible Cause of the general arterial thickening. The Patient was not an Alcoholic, but took frequent small drinks of Spirits. The Patient had to work more than she had been accustomed to do on account of reduced circumstances.

6. Blood-Pressure. 248.mm. Pulse.84.

7. Lumen, 1.63. Media, 0.310. Adventitia, 0.1078. Intima, 0.0425.
 1.54. 0.285. 0.0973. 0.0175.

There is a slight dilatation of the Lumen (probable cause being a paralysis of the Vaso-constrictors due to the Pontine Haemorrhage). The other measurements are greater than the Standard,

(Hypertrophy)

Case.48. William.P. aged.53. Labourer(Rolling Mill)

1.The Radial Artery is somewhat flattened, and the Lumen is contracted, the average diameter being, 1.11.mm. The Media is thinner than the Standard, and shows extensive fibrosis, the average thickness is, 0.227.mm. The Adventitia measures, 0.0837.mm. The Intima is very thin, being less than the Standard, its average thickness is only, 0.0131.mm.

2.The Kidneys are large (12.ozs.), firm and pale. The Cortex is mottled, due to fatty degeneration and congestion. The Capsule strips perfectly. Microscopically, There is slight thickening of the Capsule, but no downgrowths into the kidney. The vessels are congested. There is a general diffuse interstitial fibrosis, with thickening of Bowman's Capsule in a very mild degree. The Tubular Epithelium is more or less desquamated, and shows fatty change. The branches of the Renal Artery show slight thickening of the Media, but none of the Intima..

3.Cause of Death. Cerebral Haemorrhage, while in Hospital for Sub-acute Nephritis.

4.Associated Conditions. There is Hypertrophy of Both Ventricles of the Heart. There is irregular Atheroma of the Aorta, less marked in the Coronary Arteries.

5.Possible Cause of the Arterial changes found. Nothing found in the notes to account for the Condition. The thinning of all the tunics is of interesting from the fact of the occurrence

of Cerebral Haemorrhage, while in Hospital, being caused by the effort of sitting up in bed, although he had been "up" in the ward before. (The day before). The increase of the Blood-Pressure, consequent on sitting up appears to have been too much for the thin vessels to withstand. The Patient was a heavy eater, and took two to three pints of beer a day and occasionally a glass of Whiskey the first thing in the morning. He also smoked half an ounce of twist daily.

6. Blood-Pressure. 3.4.07. B.P. 160-165. mm.

14.4.07. B.P. 120. mm. (He had a clonic seizure)

16.4.07. B.P. 175. mm.

17.4.07. B.P. 190. mm. Pulse. 170.

The Patient died 26.4.07. as the result of the Cerebral Haemorrhage.

7. Lumen, 1.11. Media, 0.227. Adventitia, 0.0837. Intima, 0.0131.
 1.54. 0.285. 0.0973. 0.0175.

All the measurements are, as noted above, very small.

Case. 49. George. A. aged. 49.

1. The Radial Artery is rounded and has very thick walls. The Lumen is contracted, the average diameter being .1.05. mm. The Media is much thickened, the average measurement being, 0.442. mm. There is marked fibrosis of the Media. The Adventitia is not thickened, measuring, 0.0762. mm. The Intima is very much thickened, but not degenerated. It is irregular and its average measurement is 0.07. mm.

2. The Kidneys vary in size ($7\frac{1}{2}$. & $4\frac{1}{2}$. ozs). Both are congested. The capsule strips with great difficulty. The Cortex is tough and fibrous. There are a few cysts seen. The Renal Artery is much thickened. Microscopically, the Capsule is seen to be thick with downgrowths into the kidney substance, the downgrowths being wedge shaped, and showing small cell infiltration. There is only slight thickening of Bowman's Capsule, and only one or two of the Glomeruli are fibrosed. There is marked congestion, and the Epithelium lining the tubules is desquamated. Some of the tubes contain colloid casts and are cystic. There is slight thickening of the Intima of the branches of the Renal Artery,

3. Cause of Death. Cerebral Haemorrhage.

4. Associated Conditions. Hypertrophy of the Left Ventricle of the Heart. Patchy Atheroma of the Aorta. Atheroma of the Coronary Arteries and of the Cerebral Arteries.

5. Possible Cause of the Arterial condition found. There was no note of any possible cause in the notes.

6. Blood-Pressure. Not recorded

7. Lumen, 1.05. Media, 0.442. Adventitia, 0.0752. Intima, 0.07.
 1.54. 0.285. 0.0973. 0.0175.

The Condition of the Radial Artery is one of Hypertonus, with
 Intimal thickening.

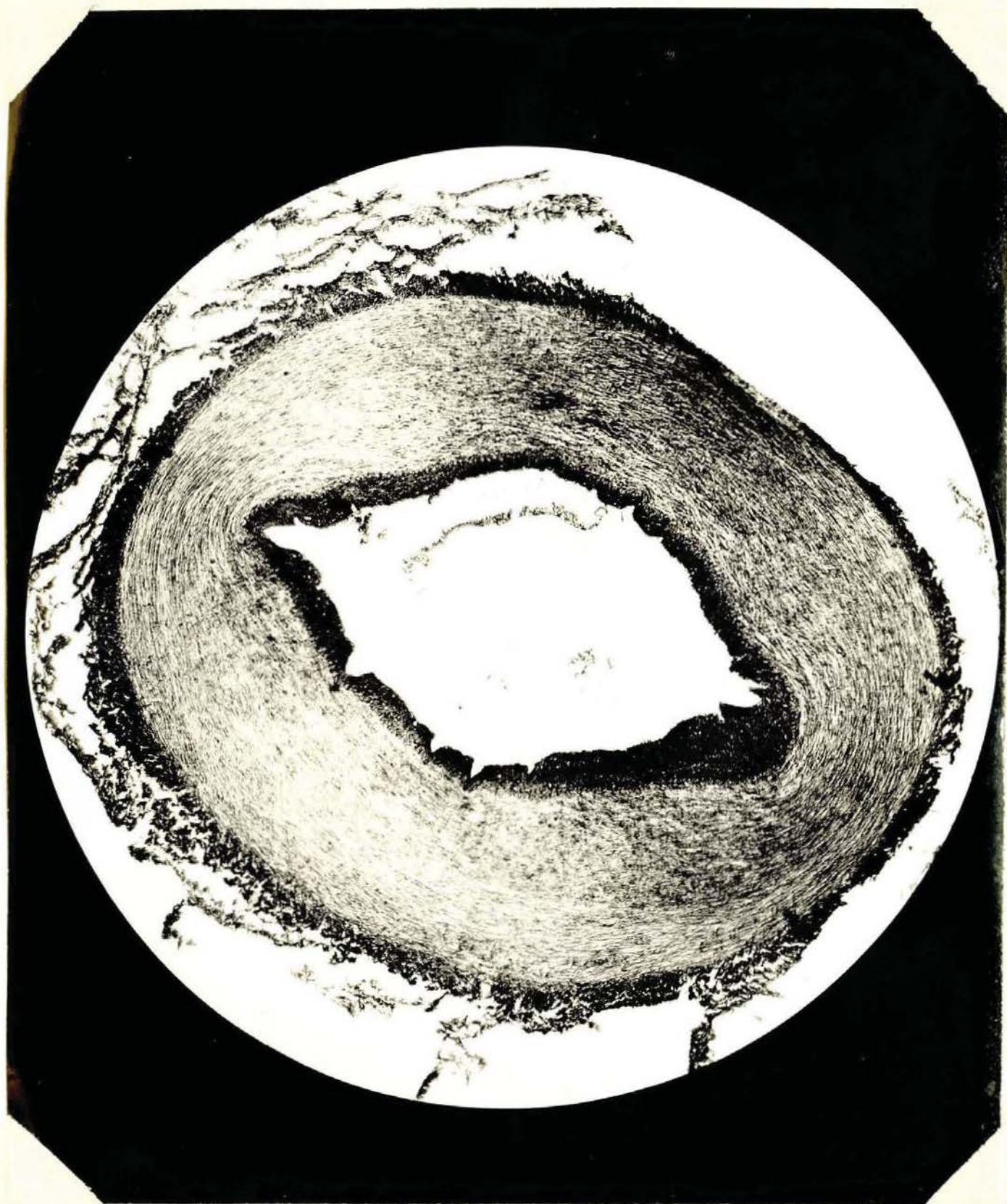
N.B. There is a Photomicrograph of the Artery shown on the next
 page.

Photomicrograph of the Radial Artery of Case.49.



The Artery is very thick, and the wall is very thick. The thickening is due to the presence of the Media which is present, but also to the presence of the Intima. The Artery is very thick, and the wall is very thick, with Intimal thickening, (Endarteritis.)

Photomicrograph of the Radial Artery of Case.49.



The Artery is very small, and the walls very thick. The thickening is due chiefly to the thickening of the Media which is present, but also to a well marked thickening of the Intima. The Artery is in a state of Hypertonus with Intimal thickening, (Endarteritis.).

Case. 50. Charles. H. aged. 56.

1. The Radial Artery is round. The Lumen is dilated and filled with a recent clot, the average diameter is, 1.7. mm. The Media is thickened and fibrosed, the average measurement is, 0.312. mm. The Adventitia is thickened, measuring, 0.1137. mm. The Intima is also thickened, with increase of the Elastic tissue, the average thickness is, 0.0845. mm.

2. The Kidneys are fairly normal in size. The Cortex is streak-
-ed. The Capsule strips easily. Microscopically, the Capsule is seen to be thickened. There is a general diffuse interstitial fibrosis, which also involves Bowman's Capsule. The Tubular Epi-
-thelium shows Cloudy-swelling. There is slight Intimal thick-
-ening in the branches of the Renal Artery.

3. Cause of Death. Adeno-Carcinoma of the Sigmoid Flexure.

4. Associated Conditions. Hypertrophy of the Left Ventricle of the Heart. Atheroma of the Aorta.

5. There was nothing noted in the History that could have caused the Arterial condition.

6. Blood-Pressure. Not recorded.

7. Lumen, 1.70. Media, 0.312. Adventitia, 0.1137. Intima, 0.0845.
1.54. 0.285. 0.0973. 0.0175.

The changes in the Radial Artery are dilatation of the Lumen, with Hypermyotrophy and Adventitial and Intimal thickening.

Case.51. Mark.J. aged.42. Cook.

1.The Radial Artery is fairly round, and has fairly thick walls. The Lumen is contracted, the average diameter being .1.33.mm. The Media is not thickened, but shows marked fibrosis, the average thickness is, .0.229.mm. The Adventitia is .0.07.mm. in thickness. The Intima is thickened, the average measurement being, .0.0772.mm.

2.The Kidneys, ($6\frac{3}{4}$ & $4\frac{1}{2}$ ozs), show swelling of the Cortex. The Capsule strips readily. Microscopically, the Capsule is seen to be slightly thickened, with a very few downgrowths of fibrous tissue into the Kidney, showing small cell infiltration. There is a general diffuse interstitial fibrosis. Bowman's Capsule is thickened, and some of the Glomeruli are fibrosed. The Tubular Epithelium is swollen and desquamated. The branches of the Renal Artery show a thickening of the Intima, with an increase of the Elastic tissue fibres.

3.Cause of Death. Pontine Haemorrhage.

4.Associated Conditions. Great Hypertrophy of the Left Ventricle of the Heart. Atheroma of the Aorta.

5.Possible cause of the Arterial condition found. There was an Alcoholic history.

6.Blood-Pressure. Not recorded.

7.Lumen,	<u>1.33.</u>	Media,	<u>0.229.</u>	Adventitia,	<u>0.07.</u>	Intima,	<u>0.0772.</u>
	1.54.		0.285.		0.0973.		0.0175.

The Intima is thickened, and the Lumen contracted. The other coats are thinner than the Standard.

Case.52. William.I. aged.55. Labourer.

1.The Radial Artery is oval in shape.The Lumen is contracted, the average diameter being,1.13.mm. The Media is slightly thickened and fibrosed, the average measurement is,0.299.mm. The Adventitia is not so thick as the Standard, its measurement being, 0.063.mm. The Intima is thickened, its average thickness being, 0.063.(The same as the Adventitia).

2:The Kidneys are larger than normal ($5\frac{1}{2}$.&.5.ozs).The Cortex is narrow.The Capsule does not strip well. Microscopically, the Capsule is slightly thickened, and shows some downgrowth into the Kidney. There is a general diffuse interstitial fibrosis of the Kidney.Bowman's Capsule is also thickened, and there is sclerosis of some of the Glomeruli. There is marked cyst formation, and the Epithelium is desquamated. There is an increase in the thickness of the Intima of the Branches of the Renal Artery in the Kidney.

3.Cause of Death. Chronic Nephritis.

4.Associated Conditions.There is Hypertrophy of the Left Ventricle of the Heart. There is extensive Atheroma of the Aorta, and of the Coronary Arteries.

5.Possible Causes of the Arterial Condition found.Excess of Alcohol, producing Hypertonus and Intimal thickening.

— 6.Blood-Pressure. 220.mm. Pulse.100.

7.Lumen,1.13. Media,0.299. Adventitia,0.063. Intima,0.063.
1.54. 0.285. 0.0973. 0.0175.

Case.53. Thomas.McC. aged.63.

- 1.The Radial Artery is round and the Lumen is contracted and filled with recent clot.The average diameter of the Lumen is, 1.33.mm. The Media is thickened and fibrosed,the average thickness being,0.343.mm. The Adventitia is thickened,measuring on an average,0.1277.mm. The Intima is also thickened and measures 0.0456.mm, in thickness. There is increase of the Elastic tissue.
- 2.The Kidneys are fibrosed. The Capsule is adherent. There are some cysts seen. Microscopically,the Capsule is a little thickened,with a few downgrowths into the Kidney . There is a general diffuse interstitial fibrosis,with thickening of Bowman's Capsule,and sclerosis of many of the Glomeruli. The Tubular Epithelium shows cloudy-swelling.Some of the Tubules are cystic and contain Colloid Casts. The branches of the Renal Arteries show thickening of the Intima with atrophy of the Media.
- 3.Cause of Death. Fracture of the Vault of the Skull.Meningeal Haemorrhage,Cerebral Haemorrhage (accidental).
- 4.Associated Conditions. Hypertrophy of the Left Ventricle.
- 5.Cause of the Arterial changes. No cause found in the Notes.
- 6.Blood-Pressure. Not recorded.
- 7.Lumen,1.33. Media,0.343. Adventitia,0.1277. Intima,0.0456.
1.54. 0.285. 0.0973. 0.0175.

The Condition of the Radial Artery is one of Hypertonus,with Adventitial and Intimal thickening.

Case. 54. Isaac. W. aged. 54. Corporation Carter.

1. The Radial Artery is rounded and has thickened walls. The Lumen is slightly contracted, the average diameter being, 1.41. mm. The Media is thickened and fibrosed, the average thick^{ness}~~ness~~ is, 0.31. mm. The Adventitia measures on an average, 0.0727. mm. The Intima is also thickened, its average thickness being, 0.04. mm. It is somewhat irregular.

2. The Kidneys are large (5½. & 6. ozs). The capsule strips with difficulty. Microscopically, there is a well marked general diffuse interstitial fibrosis. The Capsule is thickened, and shows a number of downgrowths into the Kidney. Several of the Glomeruli are sclerosed, while Bowman's Capsule is thickened in the remainder. There is thickening of the Intima of the branches of the Renal Artery in the Kidney.

3. Cause of Death. Pontine Haemorrhage.

4. Associated Conditions. Hypertrophy of the Left Ventricle of the Heart. Atheroma of the Aorta, with Calcareous plates. Atheroma of the Coronary and of the Basal Arteries of the Brain.

5. Cause of the Thickening of the Radial Artery. None found.

6. Blood-Pressure. 244. mm. Pulse. 70.

7. Lumen, 1.41. Media, 0.31. Adventitia, 0.0727. Intima, 0.04.
1.54. 0.285. 0.0973. 0.0175.

The Condition of the Radial Artery is one of Hypertonus with Intimal thickening.

Case.55. Charles.J. aged.52.

- 1.The Radial Artery is fairly round. The Lumen is contracted and is filled with recent clot,the average diameter is,1.33.mm. The Media is thickened and fibrosed and has an average thickness of 0.367.mm. The Adventitia measures,0.0903.mm. There is thickening of the Intima with a small patch of Atheroma,which is confined to the Intima,the average thickness of the Intima is,0.0525.mm. There is slight irregularity of this Tunic.
 - 2.The Kidneys both show a typical Granular Nephritis. Microscopically,the Capsule is seen to be thickened,with downgrowth into the Kidney substance. There is a general diffuse interstitial fibrosis,with thickening of Bowman's Capsule,and sclerosis of many of the Glomeruli.The Tubular Epithelium is desquamated.There is Intimal thickening with increase of Elastic tissue fibres in the branches of the Renal Artery.
 - 3.Cause of Death. Cerebral Haemorrhage.
 - 4.Associated Conditions. Hypertrophy of the Left Ventricle of the Heart. Atheroma of the Aorta,Coronary and Cerebral Arteries.
 - 5.Cause of the Arterial Changes. None found except Alcohol.
 - 6.Blood-Pressure. 280.mm. Pulse.66.per min:.
 - 7.Lumen,1.33. Media,0.367. Adventitia,0.0903. Intima,0.0525.
 1.54. 0.385. 0.0973. 0.0175.
- The Condition of the Radial Artery is one of Hypertonus,with Intimal thickening,accompanied by slight Atheroma of Intima .

Case.56. Emily Jane.C. aged.35.

1.The Radial Artery is oval, and has thick walls. The Lumen is contracted, the average diameter being, 0.91.mm. The Media is very slightly thickened, but shows marked fibrosis, the average measurement is, 0.288.mm. The Adventitia measures, 0.0875.mm. in thickness. The Intima is of fairly even thickness, the average being, 0.032.mm. The Vessel felt thick Clinically.

2.Kidneys. ($4\frac{1}{2}$ & $5\frac{1}{2}$ ozs.) There is swelling of the Medulla and Cortex. The Capsule strips well. Microscopically, the Capsule is seen to be slightly thickened. There is a general diffuse interstitial fibrosis. Bowman's Capsule is thickened, and many of the Glomeruli are sclerosed. The Tubular Epithelium is in a state of Catarrh. There is thickening of both the Intima and ~~Adventitia~~ ^{Media} of the branches of the Renal Artery.

3.Cause of Death. Uraemia. Acute Nephritis on a Chronic.

4.Associated Conditions. Hypertrophy of the Left Ventricle. Patchy Atheroma of the Aorta. Albuminuric Retinitis.

5.Cause of the arterial changes. The Patient took too much Alcohol. A brother died of a similar condition at the same age.

6.Blood-Pressure. 275.mm. Pulse.120. Two days later, B.P.270.

7. Lumen, 0.91. Media, 0.288. Adventitia, 0.0875. Intima, 0.032.
 1.54. 0.285. 0.0973. 0.0175.

The Condition of the Radial Artery is one of Hypertonus (slight) with thickening of the Intima. The smallness of the Lumen is accounted for by the fact that the Patient died in a convulsion.

(General Shaving)

Case. 57. Thomas. W. aged. 24.

1. The Radial Artery is round. The Lumen is filled with recent clot and is dilated, the average diameter being, 1.84. mm. The Media is of very irregular thickness, being thin, where the Intima is thickest and the contrary, the average thickness is, 0.177. mm. The Adventitia is much increased in thickness, being on an average, 0.1978. mm. in thickness. The Intima is in a state of Fatty Atheroma. The changes present are the conversion of the Intima into a fibrous tissue network, with fatty matter in the meshes. Many of the spaces in the network are empty. The average thickness of the Intima is, 0.1225. mm.

2. The Kidneys are congested. Microscopically, there is seen to be marked congestion. The Capsule is slightly thickened. There is a general diffuse Interstitial fibrosis, with thickening of Bowman's Capsule, and fibrosis of many of the Glomeruli. There is considerable desquamation of the Tubular Epithelium. The Intima and Media are of about equal thicknesses in the arteries.

3. Cause of Death. Cerebral Thrombosis, and Embolism.

4. Associated Conditions. Hypertrophy of the Left Ventricle of the Heart. Atheroma of the Aorta, of the Coronary, Tibial, and Radial Arteries. Vegetative Endocarditis of the Mitral Valve. There is a blocking of the Left Internal Carotid Artery. There is also a condition of Forencephaly.

5. Cause of the Arterial Condition. There was a history of

Syphilis given.

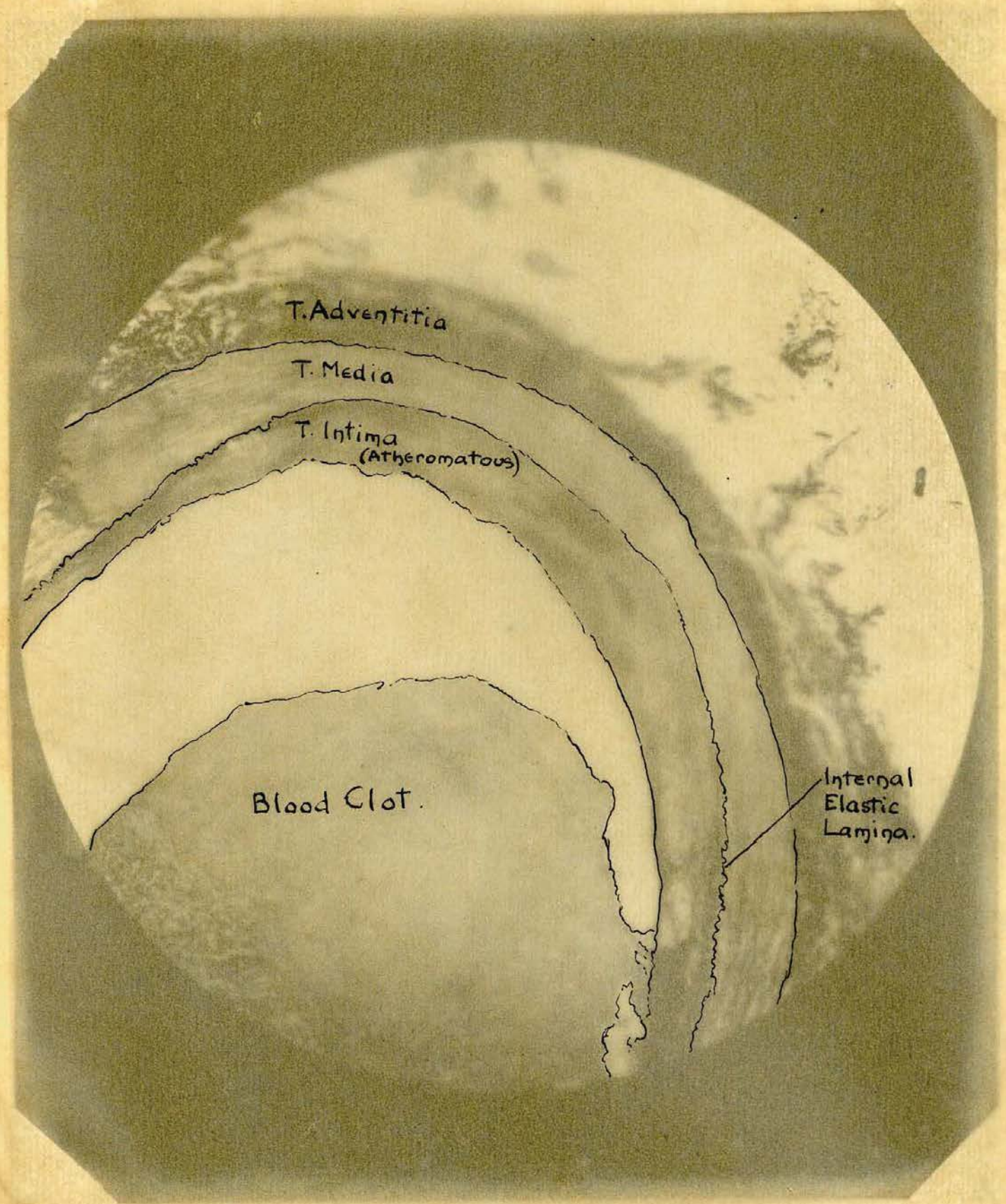
6. Blood-Pressure. 144.mm. (4.hours before Death took place).

7. Lumen, 1.84. Media, 0.177. Adventitia, 0.1978. Intima, 0.1225.
 1.54. 0.285. 0.0973. 0.0175.

There is dilatation of the Lumen of the Radial Artery, with thinning of the Media. There is advanced Atheroma of the Intima, and Compensatory thickening of the Adventitia.

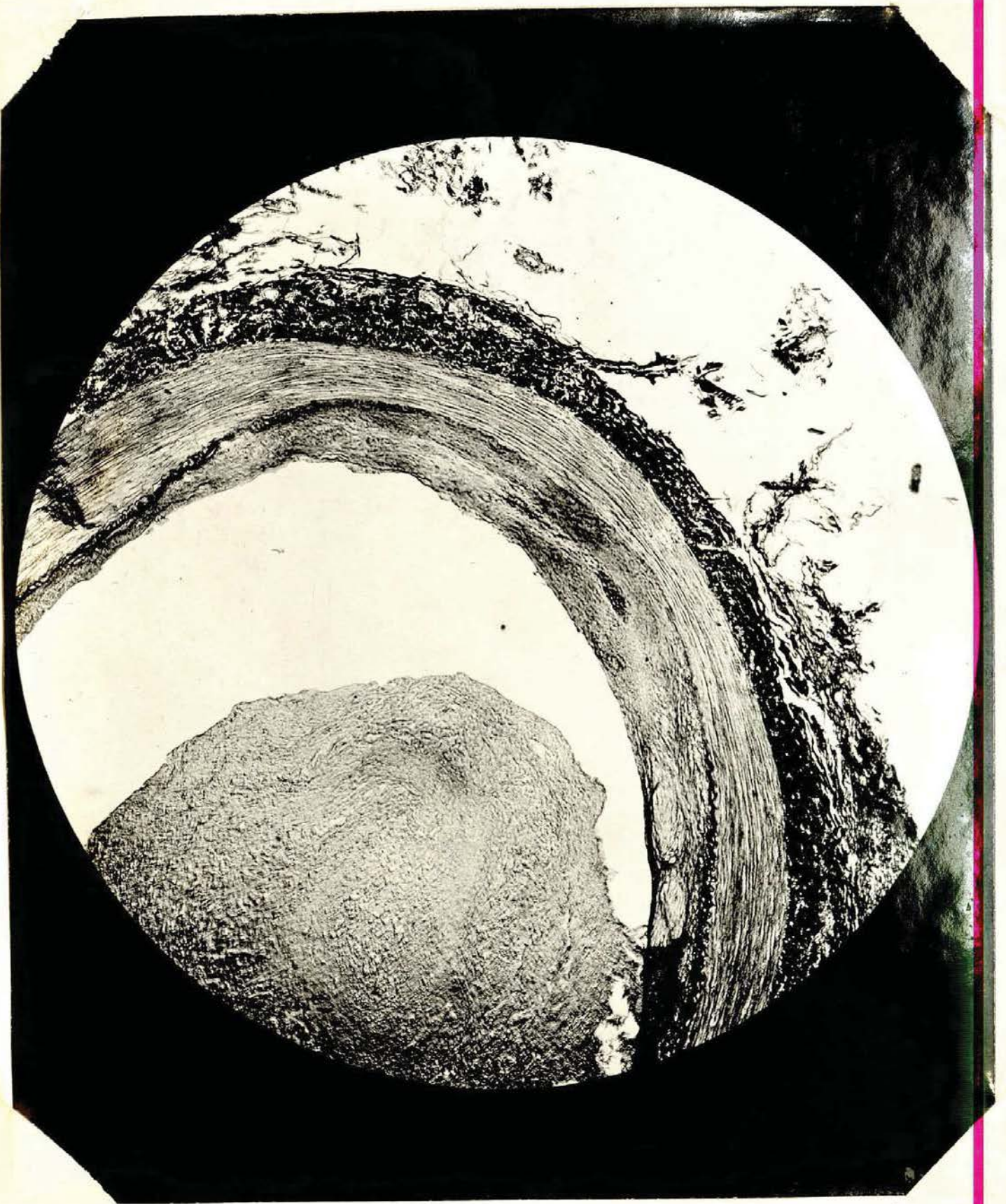
Photo-micrograph shown on next page

Photomicrograph of the Artery from Case. 57.



There is a clot in the lumen of the vessel which has shrunk in preparation, the clot is attached to the intima in the lower right hand corner of the Photograph. The Intima shows marked Atheroma, the Media is thinned in this region, and the Adventitia shows compensatory thickening.

Photomicrograph of the Artery from Case.57.



There is a clot in the Lumen of the vessel, which has shrunk in preparation, the clot is adherent to the Intima in the lower right hand corner of the Photograph. The Intima shows marked Atheroma, the Media is thinned in this region, and the Adventitia shows compensatory thickening.

Part 3.

I will now proceed to summarise the Conditions found in my series of 57 Cases, stating the conclusions to which I have come as the result of my investigations.

In reviewing the condition of the various Tunics of the Radial Artery, I was struck by the fact that in all my cases with the exception of two (cases. 27. & 48.) there was more or less **thickening** of the Intima as compared with my Standard Artery. In case. 27. The measurement was equal to that of the Standard, while in Case. 48. all the Tunics were thinner than the Standard.

The Intimal thickening was due to an increase in number of the Elastic Tissue Fibres, which form such a large part of the coat in health. I noticed that the greater the thickness of the Intima the greater the number of Elastic tissue fibres. In a large number of cases the elastic tissue was in the form of a network, in the meshes of which there were seen Connective tissue cells. In those of my cases in which there was Atheroma, namely: - Cases. 5. 7. 18. 29. 55. and 57., more especially the last mentioned, instead of the Intima being made up of Elastic tissue fibres, it is made up of Fibrous tissue arranged in the form of a network, in the meshes of which there are connective tissue cells, which have undergone a fatty degeneration. In the case of the Intima of Case. 18. the Fatty Atheroma has become secondarily infiltrated with Lime salts (Calcareous).

The Intima in Cases.30.42.&.49. is very much thickened, especially in the last named Case, a Photomicrograph of which is seen on Page.92. The Intima of the Radial Artery of Case.30. shows a condition of pure hypertrophy. There is a photomicrograph of this vessel on Page.62. The thickening in the vessel is very irregular and is not seen in its thickest part. There was no History of Syphilis in either Case.30. or Case.49. but there was in Case.42, which would account for the thickening.

In Twenty-five of my Cases, there was found to be thickening of the Intima, accompanied by a thinning of the Media. In these cases, the Intimal thickening is probably to a certain extent compensatory in origin. In Four of these Cases there was found to be a thickening of the Adventitia also. In Two of these Four cases, the Arterial change is almost entirely due to the compensatory thickening of the Adventitia and Intima.

Turning now to the Middle Coat, or Tunica Media ; Out of my Fifty-seven Cases, there was found to be thickening of this coat in greater or less degree in no less than Twenty-seven of them. Of these, in Twenty-two, the condition present was Hypertonus (as described by Dr. William Russell,) while in the remaining Five Cases there was Hypermyotrophy, (as described by Dr. Savill), but contrary to what Dr. Savill found, there was seen to be some fibrosis of the Middle Coat in a very large proportion of my 57. Cases, although in many of the Cases the change was chiefly in

the deepest or most internal part of the Media, just external to Henle's Internal Elastic Lamina.

Calcareous degeneration of the Media was observed in Five of my Fifty-seven cases, namely in Cases. 5. 6. 18. 29. and 42. The change is very marked in Case. 18. and there is a Photomicrograph showing the condition in the artery of this Case on P. 42.

In Twenty-seven of my Cases, the Media was found to be of less thickness than the Media of the Standard Artery. In Two of my Cases the measurement was almost the same as that of the Standard. In Cases. 2. & 8. the Media was only half the Standard thickness. Case. 2, was that of a Boy aged. 12. which would account for the thin vessel wall. In Case. 8., there was compensatory thickening of the Intima and Adventitia. Cases. 3. & 11. are the Cases which show the Media of Standard thickness.

In those cases in which there is Atheroma involving the Intima, there is almost entire absence of Henle's Internal Elastic Lamina in the region of the artery involved; if not absent it is broken across. In Case. 29, however, although there is Atheroma and Calcareous degeneration of the Media in addition, Henle's Elastic Lamina is intact. In this case there was Atheroma of most of the larger and medium sized vessels, for example the Popliteal. The Tunica Media in Case. 42. was thinner than the Standard, and there was no compensatory thickening of the Intima or Adventitia, but thinning of these Tunics also. This

is of interest from the fact of his having died from a Cerebral Haemorrhage, while in Hospital for Sub-acute Nephritis. This Patient had a high Blood-Pressure (160-190.mm.)

In none of my Cases was there thickening of the Adventitia alone, but in Ten cases it was accompanied by Intimal thickening, in one of these cases namely Case.57, the intimal thickening was due to Atheroma. In Five of these Ten cases there was also thickening of the Media.

In Four cases the thickening of the Adventitia was compensatory, namely in Cases.8.11.16. and 57. in the last mentioned there was much thinning of the Media and very advanced Atheroma of the Intima.

In Three cases, namely, Cases.23.31. and 35. the Adventitia is of the same thickness as the Standard. In the remaining cases, Forty-three in number there was thinning of the Adventitia.

Considering now the size of the Lumen of the Radial Artery, in Seven of my cases, it was dilated, in Three cases it was of ~~normal~~ ^{Standard} diameter, while in the remaining cases, it was more or less contracted. The smallest diameter of the Lumen in my series was that of the Artery in Case.42. in which there was a very thick Media and Intima, the latter encroaching on the Lumen. The largest diameter of the Lumen, occurred in Case.57., in which there was marked thinning of the Media, accompanied by Atheroma of the Intima and compensatory thickening of the Ad-

-ventitia. Viewed with the naked Eye, the shape of the Artery in Twenty-five cases was rounded, while in the remaining Thirty-two cases it was oval or elliptical.

The Macroscopic and Microscopic examination of the Kidney in my cases, revealed in a great majority of cases, the presence of a general diffuse interstitial fibrosis, in some of the cases with other changes as well. In only Eleven of my cases was the cause of Death described as being due to Nephritis. The following is the analysis of the Kidney condition found:-

Acute Nephritis;	2.	Sub-acute Nephritis.	4.	6.Cases.
Chronic Nephritis,	-----			23.Cases.
Chronic Nephritis with Cloudy-swelling,	--			8.Cases.
Chronic Nephritis with acute Exacerbation.				11.Cases.
Cloudy-swelling of the Tubular Epithelium.				6.Cases.
Congestion.	-----			1.Case.
No Change,	-----			2.Cases.

In examining the branches of the Renal Artery in the Kidney, in those cases in which there was thickening of the Intima, the thickening was due to an increase in the Elastic tissue fibres. In more than half the cases there was some change seen in the Intima, while in a little more than a third of the cases there was a change found in the Media. The following is a summary of the conditions found:-

Thickening of the Intima.Atrophy of the Media.	13.Cases.
Thickening of the Intima.Normal Media,-----	23.Cases.
Thickening of the Intima and the Media,-----	4.Cases.
Intima normal.Media thickened,-----	3.Cases.
Intima and Media equally thickened,-----	2.Cases.
No change in the Intima or Media,-----	12.Cases

The Probable Cause of the Arterial Change in my series of Cases is as follows:-

Alcohol,----- 17.Cases.

Toxic. Peritonitis.7.cases.

Nephritis. 1.case.

Pyaemic. 4.cases.

12.Cases

Lead.3.cases. Brass.1.case----- 4.Cases.

Work and Exposure,----- 3.Cases.

Syphilis,----- 2.Cases.

Excess of Alcohol and Tobacco,----- 2.Cases.

Scarlet Fever.Nephritis,----- 1.Case.

Congenital Defect,----- 1.Case.

No Cause found. ----- 14.Cases.

Standard Artery,----- 1.Case.

Turning now to the Associated morbid Conditions present.In Fifty-one of my Cases, there was Hypertrophy of the Left Ventricle, while in one case (Mitral Stenosis), the Right Ventricle

was Hypertrophied. In the remaining Five cases there was no Hypertrophy of the Heart, in four of these cases there was no thickening of the Tunica Media of the Radial Artery, while the other case was my Type Case. Atheroma occurred in the Aorta in Forty-six Cases, in the Coronary Arteries in Thirty-eight cases, in the Cerebral Arteries in Seventeen Cases. There was Calcareous degeneration of the Coronary Arteries in Four Cases, In Twenty-five Cases there was no note of the Condition of the Aorta, or Coronary and Cerebral Arteries, while in the remaining Fifteen Cases there was no Atheroma in any of these vessels.

The Cause of Death is shown in the following summary:-

Cerebral or Pontine Haemorrhage.	-----	11.Cases.
Peritonitis.	-----	7.Cases.
Heart Failure.	-----	6.Cases.
Subacute Nephritis.	-----	4.Cases.
Chronic Nephritis.	-----	4.Cases
Pneumonia.	-----	3.Cases.
Uraemia.	-----	3.Cases.
Carcinoma of Rectum or Pancreas.	-----	2.Cases.
Perinephritic, or Periurethral Abscess.		2.Cases.
Accident.	-----	2.Cases.
Valvular Disease of the Heart.	-----	2.Cases.
Cerebral Embolism and Thrombosis.	-----	1.Case.
Pyæmia. 1.Case. Abscess of Lung. 1Case.		2.Cases.

Chronic Alcoholism.-----	1.Case.
Ruptured Left Ventricle.(Heart).-----	1.Case.
Chronic Nephritis.Arterio-Sclerosis.--	1.Case.
Infarct of the Lung.-----	1.Case.
Gangrene of the Leg.-----	1.Case.
Cerebellar Tumour.-----	1.Case.
Carbolic Acid Poisoning.-----	1.Case.
Intestinal Obstruction.-----	1.Case.

In Nineteen⁰ of my Cases there is a record of the Blood-Pressure. The readings vary from 120.mm. to 275.mm. There were readings of 120.mm. in two cases, in both of which the reading is that taken during a clonic spasm occurring in Bright's Disease, the readings at other times in these cases were much higher, in Case.11. being, 210.-240.mm. and in Case.48. being 160.-190.mm. In Case.16. the Blood-Pressure was 135.mm. but the circulation in this case was feeble the Patient dying of an Infarct of the Lung. In Case.57. the Pressure was 144.mm. the Patient in this case was only 24.years old, but showed well marked Atheroma in the Radial Artery. The highest Pressure recorded in my series of cases was in a Case of Uraemia in a female Patient (Case.56.) in which the Blood-Pressure was 270.-275.mm. The observations were made both by Dr.Graham Walker, and myself, seeing that it was so high. In the only case in which the Cause of Death was said to be due to Arterio-sclerosis-

-is, (Case. 28.) there is no numerical record of the Blood-pressure, although the Clinical Notes describe it as "High".

From my observations on the condition of the various Tunics of the Radial Artery, I have come to the conclusion that the condition Arterio-sclerosis should be defined as follows:- Arterio-sclerosis is a condition occurring in the Medium sized Arteries, in which the vessel is more rigid, and the wall is thicker than normal. The change is chiefly in the Tunica Media, but is not confined to this tunic, the Intima being also thickened, but not degenerated in a large number of cases. In this absence of Intimal degeneration lies the essential difference between Arterio-sclerosis and Atheroma.

When the Hypertrophy of the Media is associated with a contraction of the average diameter of the Lumen, the condition is called "Hypertonus", while if there is no such contraction the condition is called "Hypermyotrophy".

Atheroma, as mentioned in the earlier part of my Conclusions consists of a hyperplasia of the Subendothelial Connective Tissue, with fatty degeneration, and in some cases infiltration of the fatty matter with Calcareous salts. Atheroma is a degeneration of the Tunica Intima, although it may break through the Internal Elastic Lamina of Henle, and subsequently come to encroach upon and involve the Tunica Media.

Thus Arterio-sclerosis and Atheroma are two distinct Path-

-ological conditions although they may both occur in the same subject, as they are found to do in many of my Cases.

In all of my Twenty-seven cases which show either Hypertonus or Hypermyotrophy of the Radial Artery, there was also found a more or less degree of interstitial fibrosis of the Kidney, in many of the Cases, the change was very marked. In respect to the condition of the Tunics of the branches of the Renal Artery in the Kidney in these Cases, in all but Two, the Intima is described as thickened, with increase of the Elastic Tissue; in the Two cases in which there was no thickening, the Intima was normal. In Five of the Cases, the Media was thickened also. Thus in the smaller arteries, e.g. those of the Kidney, the changes are not the same as those occurring in the Medium sized Arteries.

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